ICF KAISER
ENVIRONMENT AND FACILITIES MANAGEMENT GROUP

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ICF Kaiser Engineers, Inc.
Gateway View Plaza
1600 West Carson St.
Pittsburgh, PA 15219
412/497-2000 Fax 412/497-2212
http://www.icfkaiser.com

November 30, 1998

Mr. John Osolin
Geologist / Project Manager
US EPA – Region II
290 Broadway – 19th Floor
New York, NY 10007-1866

Subject: **Response to Comments - Pulverizing Services Site Health and Safety Plan**
Pulverizing Services Site, Moorestown, New Jersey

Dear Mr. Osolin:

The following responses are provided to comments received from you on November 19, 1998. In addition, an addendum to the Pulverizing Services Site Health and Safety Plan dated, October 29, 1998, is attached to add comment information to the Health and Safety Plan.

COMMENT 1:

Does OSC agree with sampling in Level D?

Response:

The following equation was used to calculate real-time action levels for Level D and to upgrade to Level C. This equation conservatively assumes all aerosol detected by real-time instrumentation are contaminated.

$$\frac{(10^6 \text{ mg / kg})\ (\text{PEL in mg / m}^3)}{\text{(Soil concentration in mg/ kg)}}$$

COMMENT 2:

No separate spill containment program.

Response:

Section 9.8 of the HASP has been added to provide the following information:

SPILLS

If a spill of hazardous material occurs, the following actions will be taken:

- Notify the field operations leader immediately.
- Take immediate measures to control and contain the spill within site boundaries.
- Isolate the hazardous area, and keep unnecessary personnel away.
- Stay upwind and keep out of low-lying areas.
- Allow no flares, smoking, or flames in hazard area.
- For liquids, keep combustibles away from the spilled materials.

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Small Dry Spills

Shovel contaminated materials into dry containers and cover. Use care not to make material airborne. Label the containers as to contents and remove to a secure area.

Small Liquid Spills

Absorb the liquid with sand, clean fill, or other noncombustible absorbent material. Place contaminated material in a container, cover and label it, and remove it to a secure area.

COMMENT 3:

Site map should show where zones are located.

Response:

Work zones are established in section 5.3 of the health and safety plan. The site safety and health officer shall identify contaminated areas using flagging and the specific location for the contamination reduction zone prior to the initiation of work.

COMMENT 4:

Did not see any standing orders for the zones, such as no smoking, eating, etc. in the hot zone; buddy system.

Response:

Attachment B, Employee Health and Safety Rules, establishes standing orders for site activities. The following section will be added to the health and safety plan:

2.4 BUDDY SYSTEM/SITE COMMUNICATIONS

If the size or topography of the site is such that operations will be conducted out of continuous visual contact with support zone personnel, a buddy system, or means of immediate voice communication (two-way radio) shall be instituted.

COMMENT 5:

Site communication information not found.

Response:

Refer to response to Comment No. 4.

COMMENT 6:

Routes of exposure are not identified for each contaminant of concern.

Response:

Table 4-1, Constituents of Concern, has been updated to incorporate routes of potential exposure. In general, the compounds of concern present an exposure hazard through direct contact, but absorption, inhalation and accidental ingestion are also potential routes of exposure.

COMMENT 7:

Recommend use of a FID instead of a PID as a direct reading instrument for contaminants.

Response:

Table 4-1, Constituents of Concern, has been updated to incorporate ionization potentials for volatile organic compounds. All the ionization potentials for volatile organic compounds are below 11.7 eV. A PID equipped with an 11.7 eV lamp will be used.

COMMENT 8:

The emergency response plan needs to include the following information:

1. Pre-emergency planning.
2. Personnel roles.
3. Emergency recognition and control.
4. Safe distances and places of refuge.
5. Site security and control.
6. Evacuation procedures.
7. Emergency decontamination.

Response:

Section 9.1 of the HASP shall be revised to include the following information:

In the event of an emergency requiring notification of off-site personnel, the field operations leader is responsible for immediately contacting the appropriate agencies. If the field operations leader is unavailable, the site safety officer will perform this function. A list of phone numbers for emergency agencies and utilities will be posted near each phone in the field office.

Each day or as often as necessary, the field operation leader shall designate an assembly point in case of emergency (i.e. main gate). Whenever an employee reports, or becomes aware of an emergency conditions, the employee shall immediately contact the field operations leader via two-way radio and proceed to the designated assembly point. The field operation leader shall account for all personnel on site, and shall provide instructions on further actions to be taken, including declaration of "all clear".

Upon arrival of emergency response personnel, the field leader will relinquish control of the emergency to response personnel. The field leader will control access of unauthorized visitors to the site and provide safe egress for emergency vehicles.

In the event of injury occurring to an individual while contaminated, the designated first aid personnel shall conduct decontamination procedures on the injured party donning the appropriate level of PPE. If the severity of injury does not permit decontamination prior to removal from the site, the field operations leader shall inform emergency rescue personnel of possible contaminates and wrap the victim in a blanket or similar barrier creating devices to prevent cross contamination.

Should you have any questions regarding the responses to these comments, please feel free to contact Dan Welshons at 412/497-2329 or myself at 412/497-2265.

Yours truly,

A. Douglas Weeks, Jr.
Project Manager

Daniel J. Welshons, CSP
Safety and Health Manager

/lm

Attachment

cc: Patrick J. Kelly, P.P.G.

HEALTH AND SAFETY PLAN ADDENDUM

Section: 2.4, 4.0, 9.1, 9.8

Addendum: 1

SITE DESIGNATION / LOCATION:

Effective Date: November 30, 1998

Pulverizing Services Site
Moorestown, New Jersey

Approved By:
Project Health and Safety Officer: _____

Date: _____

SUBJECT:

- Buddy System/Site Communication
- Hazard Evaluation
- Emergency Procedures – General
- Spills

Concurrence:

Project Manager: _____

Date: _____

Sheet: 1 of 5

2.4 BUDDY SYSTEM/SITE COMMUNICATIONS

If the size or topography of the site is such that operations will be conducted out of continuous visual contact with support zone personnel, a buddy system, or means of immediate voice communication (two-way radio) shall be instituted.

4.0 Hazard Evaluation

(Revised Table 4-1 Attached)

9.1 Emergency Procedures - General

In the event of an emergency requiring notification of off-site personnel, the field operations leader is responsible for immediately contacting the appropriate agencies. If the field operations leader is unavailable, the site safety officer will perform this function. A list of phone numbers for emergency agencies and utilities will be posted near each phone in the field office.

Each day or as often as necessary, the field operation leader shall designate an assembly point in case of emergency (i.e. main gate). Whenever an employee reports, or becomes aware of an emergency conditions, the employee shall immediately contact the field operations leader via two-way radio and proceed to the designated assembly point. The field operation leader shall account for all personnel on site, and shall provide instructions on further actions to be taken, including declaration of "all clear".

Upon arrival of emergency response personnel, the field leader will relinquish control of the emergency to response personnel. The field leader will control access of unauthorized visitors to the site and provide safe egress for emergency vehicles.

In the event of injury occurring to an individual while contaminated, the designated first aid personnel shall conduct decontamination procedures on the injured party donning the appropriate level of PPE. If the severity of injury does not permit decontamination prior to removal from the site, the field operations leader shall inform emergency rescue personnel of possible contaminates and wrap the victim in a blanket or similar barrier creating devices to prevent cross contamination.

9.8 SPILLS

If a spill of hazardous material occurs, the following actions will be taken:

- Notify the field operations leader immediately.
- Take immediate measures to control and contain the spill within site boundaries.
- Isolate the hazardous area and keep unnecessary personnel away.
- Stay upwind and keep out of low-lying areas.
- Allow no flares, smoking, or flames in hazard area.
- For liquids, keep combustibles away from the spilled materials.

Small Dry Spills

Shovel contaminated materials into dry containers and cover. Use care not to make material airborne. Label the containers as to contents and remove to a secure area.

Small Liquid Spills

Absorb the liquid with sand, clean fill, or other noncombustible absorbent material. Place contaminated material in a container, cover and label it, and remove it to a secure area.

TABLE 1

CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter/Ionization Potential (eV	Routes of Entry (1)	Media (2)	Maximum Concentration (3)	Symptoms of Exposure	Permissible Exposure Limit
Benzene/9.24	Inh, Abs, Ing, Con	SE	0.098 ppm	Irritation of eyes, skin, nose, and respiratory system, giddiness, headache, nausea, fatigue, lassitude, dermatitis, [carc]	1 ppm
Carbon Tetrachloride/11.47	Inh, Abs, Ing, Con	GW	0.01 ppm	Irritation of the eyes and skin,	10 ppm
Chlorobenzene/9.07	Inh, Ing, Con	SE	0.098 ppm	Irritation, eyes, skin, nose, drowsiness, incoherent, CNS depression	75 ppm
Chloroform/11.42	Inh, Abs, Ing, Con	GW	0.015 ppm	Irritation of eyes and skin; dizziness, mental dullness, nausea, confusion, headache, fatigue,	C 50 ppm
Ethylbenzene/8.76	Inh, Ing, Con	SE	0.098 ppm	Irritation of yes and skin, mucous membrane headache, dermatitis, narcosis	100 ppm
Trichloroethene/9.45	Inh, Abs, Ing, Con	SE	2600 ppm	Irritation of eyes, skin, headache, vertigo, visual distortion, fatigue, giddiness, nausea, vomiting, dermatitis, [carc]	100 ppm
Tetrachloroethene/9.32	Inh, Abs, Ing, Con	GW	0.140 ppm	Irritation of eyes, nose and throat, nausea, flush face and neck, vertigo, dizziness, incoherent, headache, [carc]	100 ppm
Benzo(a)anthracene	Inh, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Benzo(a)pyrene	Inh, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Benzo(b)fluoranthene	Inh, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Benzo(k)fluoranthene	Inh, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Butylbenzylphthalate	Inh, Abs, Ing, Con	SE	0.57 ppm	Irritation of eyes, nose and throat, headache, drowsiness, and drunkenness	NE
Chrysene	Inh, Abs, Ing, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3

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CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter/Ionization Potential (eV	Routes of Entry (1)	Media (2)	Maximum Concentration (3)	Symptoms of Exposure	Permissible Exposure Limit
Fluoranthene	Inh, Abs, Ing, Con	SE	45 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Phenanthrene	Inh, Abs, Ing, Con	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Pyrene	Inh, Abs, Ing, Con	SE	10 ppm	Irritation of skin	0.2 mg/m3
4,4'-DDT	Inh, Abs, Ing, Con	SE/S	6800 ppm	Irritation of eyes, nose and throat, dizziness, headache	1 mg/m3
DDD	Inh, Abs, Ing, Con	S	270 ppm	Nausea, vomiting, diarrhea, headache, dizziness, convulsions	NE
DDE	Inh, Abs, Ing, Con	S	270 ppm	Ingestion problems, menstrual disorders	NE
DDT	Inh, Abs, Ing, Con	SW/GW/S/S	27200 ppm	Irritation of eyes, nose and throat, dizziness, headache	1 mg/m3
Aldrin	Inh, Abs, Ing, Con	S	6.9 ppm	Headache, dizziness, nausea, vomiting, myoclonic, and jerks of limbs	0.25 mg/m3
Alpha-BHC	Inh, Abs, Ing, Con	SW/GW	0.310 ppm	Irritation	NE
Dieldrin	Inh, Abs, Ing, Con	SW/GW/S/S	2200 ppm	Headache, dizziness, nausea, vomiting, limb jerks, convulsions and coma	0.25 mg/m3
Beta-Gamma	Inh, Abs, Ing, Con	GW/SW	0.009 ppm	Irritation, vomiting, digestive disorder	NE
Delta-Gamma	Inh, Abs, Ing, Con	GW/SW	0.016 ppm	Irritation	NE
Gamma-BHC	Inh, Abs, Ing, Con	GW	0.035 ppm	Irritation, nausea, vomiting, headache, dizziness, convulsions, coma, blush skin	NE
Lindane	Inh, Abs, Ing, Con	GW/SW	0.004 ppm	Irritation of eyes, skin, nose and throat, headache, nausea	0.5 mg/m3
Malathion	Inh, Abs, Ing, Con	GW	0.023 ppm	Nausea, vomiting, diarrhea, stomach pain, chest pain, headache, dizziness	NE

CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter/Ionization Potential (eV	Routes of Entry (1)	Media (2)	Maximum Concentration (3)	Symptoms of Exposure	Permissible Exposure Limit
Pentachloronitrobenzene	Inh, Abs, Ing, Con	SE	48 ppm	Irritation, bluish skin color, lung congestion, nausea, vomiting	NE
Sevin	Inh, Abs, Ing, Con	GW	14.5 ppm	Nausea, vomiting, diarrhea, stomach pain, chest pain, headache, dizziness	5 mg/m3
Arsenic	Inh, Abs, Ing, Con	S/GW/SW	132 ppm	Irritation of skin, possible dermatitis, respiratory distress, diarr	0.01 mg.m3
Cadmium	Inh, Ing,	SW/GW	0.496 ppm	Irritation of eyes, nose and respiratory system, headache, dizziness, weakness, giddiness, confusion, nausea, vomiting	0.005 mg/m3
Chromium	Inh,Ing,Con	S/W/SW	96.5 ppm	Irritation of eyes, skin and lungs	0.5 mg/m3
Lead	Inh,Ing,Con	S/W/SW	480.5 ppm	Weakness, lassitude, insomnia, facial pallor, constipation, abdominal pain, gingival lead line	0.05 mg/m3

1 - Inh- Inhalation, Abs- Absorption, Ing- Ingestion, Con- Direct Contact

2 - S: Soil; GW:Groundwater; SW: Surface Water; SE: Sediment

3 - *Maximum concentration is largest detection of soil, groundwater, surface water and sediment.*

NE = Not Established

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2.0 SOIL EXCAVATION APPROACH

Pesticide-impacted soils will be excavated and removed from four locations at the S.P. Richards property, as illustrated on Figure 2. Soil sampling results indicate that contamination is limited to shallow soils, with an anticipated excavation depth of one to two feet below ground surface (bgs). Soils will be excavated and loaded directly into appropriate hauling vehicles for transfer to the Pulverizing Services Site, where they will be staged in Building #29 for subsequent characterization and off-site disposal. Based on the existing analytical data, the established cleanup criteria, and the proposed limits of excavation, it is estimated that approximately 1,500 cubic yards of soil will be excavated from the S.P. Richards property.

Field sampling using a Dexsil screening kit (or equivalent) will guide the excavation activities. Confirmatory samples will be collected for analysis at an off-site laboratory to ensure that all soils containing pesticide concentrations above the established cleanup levels have been removed. Once it has been confirmed that no further excavation is required, the excavated areas will be backfilled with clean fill material and restored. All work will be performed to minimize disruption to the property owner.

The following sections discuss, in more detail, the specific activities that will be performed to allow for safe completion of the scope of work.

2.1 SITE HEALTH AND SAFETY PLAN

A site-specific Health and Safety Plan (HASP) has been prepared for the excavation activities to be performed at the S. P. Richards property (See Attachment A). The HASP addresses protection of site workers during performance of the excavation activities, decontamination procedures, real-time air monitoring for dust, and protection of public health from exposure to hazardous substances during performance of the excavation and waste handling activities.

Prior to mobilization, all contractor personnel who will be working on-site will be required to read and sign the HASP. In addition, personnel conducting intrusive soil/sediment excavation work on the S.P. Richards property will be OSHA 40-hour HAZWOPER trained and possess a current certification.

2.2 SURVEYING AND UTILITY CLEARANCE

Prior to excavation, a site survey will be conducted to mark out the preliminary limits of excavation for each area where soils are to be removed, as identified on Figure 2. Surveying activities will be performed by a surveyor licensed in the State of New Jersey. The survey will be performed to an accuracy of +/- 0.10 feet. Stakes and flagging will be placed in the ground at the corners of the excavation areas to delineate the excavation "footprints". Survey personnel will be OSHA 40-hour HAZWOPER–trained.

In conjunction with the initial site survey, a utility check and markout will also be performed. ICF Kaiser will contact Garden State Underground Plant Location Service to confirm the presence or absence of any subsurface utilities in the vicinity of the proposed excavation areas. On-site personnel from S.P. Richards will also be contacted to aid in identifying utility locations.

2.3 MOBILIZATION

During the mobilization phase, the appropriate labor, equipment, and materials required to complete the work will be brought to the Site. Excavation activities will not be initiated until the necessary facilities and equipment are available, including applicable health and safety equipment.

2.4 SITE PREPARATION

Prior to initiating the excavation activities, the necessary site preparation activities will be performed. These activities are necessary to allow for safe completion of the excavation work. The site preparation activities include:

- Installation of temporary construction fencing;
- Clearing and grubbing the excavation work limits as necessary;
- Establishment of erosion and sedimentation controls;
- Establishment of a temporary staging area for excavated soils; and
- Construction of temporary decontamination facilities.

These activities are discussed in further detail in the following sections. Care will be taken during performance of the site preparation activities to minimize the generation of dusts. Dust mitigation procedures will be implemented as necessary.

Temporary Construction Fencing

Temporary 4-foot high orange construction fencing will be installed around the excavation areas, and at other necessary locations, to establish the site work zones (exclusion zone, contamination reduction zone, and clean/support zone). Establishment and maintenance of these zones will ensure that access to the working areas during the excavation activities is restricted to authorized personnel only. Appropriate signs and markings will be used to mark the site zones and warn passers-by of the potential hazards.

Clearing and Grubbing

Clearing and grubbing will include removal of trees and vegetation from proposed excavation and staging areas. Debris from the clearing and grubbing activities will be chipped and used as mulch on the S.P. Richards property (if desired by S.P. Richards) or the Pulverizing Services Site. Dust mitigation (i.e., water spraying) will be implemented, as necessary, during the clearing and grubbing activities to minimize the generation of dust.

Erosion and Sedimentation Controls

Prior to beginning the excavation activities, the necessary erosion and sedimentation controls will be installed. Activities associated with this task include installation of silt fence, installation of temporary earthen berms around excavation areas, and installation of straw bale barriers around existing storm drains, if any, in the vicinity of the excavation areas.

Staging Area

Soils excavated at the S. P. Richards property will be loaded into hauling vehicles and transferred to the Pulverizing Services Site, where they will be staged on two layers of 6-mil plastic sheeting in Building #29. Care will be taken during the staging of soils to prevent tracking materials across the Building floor. In addition, soils placed in Building #29 will be covered at the end of each day with plastic sheeting to aid in preventing contamination of the Building. All open ground-floor windows and doors in Building #29 will be boarded over to prevent access by trespassers, with the exception of those entrances required to allow for movement of equipment and authorized personnel. At the completion of the staging activities, the building entrances used by personnel and heavy equipment will also be boarded shut to prevent unauthorized access to the Building.

Decontamination Facilities

Vehicle and personnel decontamination facilities will also be constructed during the site preparation phase. The locations for the decontamination facilities will be selected to allow easy access to and from areas where excavation activities are performed. It is anticipated that the decontamination facilities will be temporary, mobile facilities that can be located a short distance from each area of the property where soils will be excavated. The decontamination facilities will be constructed to prevent splashing of fluids during decontamination and to allow for collection of decontamination fluids and residues. All decontamination wastes and materials used for construction of the decontamination facilities will be collected and placed in DOT-approved containers for subsequent disposal at an approved, off-site facility. The containers of decontamination wastes will be staged in Building #29 at the Pulverizing Services Site, and will be disposed of at the same time as the excavated soils and other drums presently staged in Building #29.

2.5 SOIL EXCAVATION AND REMOVAL

This section outlines the procedures that will be followed during the excavation and removal of soils containing pesticide concentrations in excess of the established cleanup levels.

Soil Excavation

Figure 2 illustrates the preliminary limits of excavation for the four areas to be excavated at the S.P. Richards property (Areas OS1, OS2, OS3, and OS4). The preliminary excavation limits were developed based on the results of previous sampling activities, which indicated that the soils in these areas contain one or more of the pesticide contaminants of concern in excess of the established cleanup levels. Although excavation activities in Areas OS1, OS2, and OS3 will be performed in proximity to the

railroad tracks located between the Pulverizing Services Site and the S.P. Richards property, it is assumed that removal of the tracks will not be required. In addition, as some of the excavation activities will occur adjacent to existing buildings and paved areas, care will be taken to prevent any damage to, or jeopardize the integrity of, these structures. As excavation beneath buildings and paved areas will not be performed, shoring and bracing is not anticipated to be required to adequately protect the existing structures.

As previously stated, prior to excavation, the preliminary limits of excavation will be surveyed and staked. Excavation will be performed using standard earthmoving equipment and techniques. Care will be taken during the excavation activities to minimize the generation of dusts and to ensure that the work is completed without jeopardizing the safety of remediation workers, S.P. Richards employees, or the surrounding community. Throughout the excavation activities, dust emissions will be monitored and mitigation techniques will be implemented as necessary (i.e., water spraying).

At this time, it is anticipated that excavation activities will be limited to shallow soils (one to two feet bgs). Therefore, the potential for encountering groundwater within the excavations is unlikely. Temporary berms will be constructed, as necessary, around each excavation area to prevent surface runoff from entering or exiting the exposed excavations.

Excavated soils will be loaded directly into dump trucks for transportation to the Pulverizing Services Site, where they will be staged in Building #29 while awaiting characterization, transportation, and disposal (See Figure 1 for Building #29 location). To the extent possible, materials from each separate removal area will be segregated. Additional segregation of soils removed from an individual area may also be performed based on visual characterization. Upon completion of the soil excavation activities to the necessary depth, as specified on Figure 2, field screening samples and confirmatory samples will be collected. The field screening and confirmatory sampling will be performed in accordance with the procedures presented in Section 2.6.

Once it has been determined through field screening and confirmatory sampling that all soils with pesticide concentrations exceeding the established cleanup criteria have been removed, the excavated areas will be backfilled.

2.6 CONFIRMATORY SAMPLING

Field screening and confirmatory sampling will be conducted to ensure that soils containing contaminant concentrations exceeding the cleanup criteria have been removed. Field screening and confirmatory sampling will be conducted, in accordance with the procedures presented below, in those excavation areas which are not bounded by a previously-collected "clean" sample. Soil samples for field screening and laboratory analysis will be collected using a decontaminated stainless steel trowel or hand auger. The detailed sample collection procedure is presented in the Sampling and Analysis Plan included herein as Attachment B.

Field Screening

Once the preliminary limits of excavation illustrated on Figure 2 have been excavated, field screening will be conducted to rapidly assess whether or not concentrations of pesticides above the established cleanup levels remain in the soils on the base and/or sidewalls of the excavations. On the excavation floors, the field screening will be used as an evaluation tool to determine whether soils have been removed to the proper depth. On the excavation sidewalls, field screening will be used to confirm the lateral extent of contamination, as delineated during previous soil sampling activities at the property.

The location of the potential field screening samples will be based on field observations, the size of the excavation area, and the presence, if any, of visibly impacted soils. In accordance with New Jersey Department of Environmental Protection (NJDEP) requirements, one field screening sample will be collected at the top of each sidewall for every 30 linear feet of sidewall, and one sample will be collected from the excavation bottom for every 900 s.f. of floor area. Soil samples for field screening will be prepared and extracted in the field, in accordance with Dexsil's recommended procedures. The chloride concentration in the screening sample will be compared to calibration curves in order to estimate the pesticide concentration in the remaining soils.

If the field screening indicates that soils with pesticide concentrations exceeding the cleanup criteria remain on the excavation floor and/or sidewalls, additional excavation of soils will be performed until field screening results indicate that soil concentrations are below the established cleanup levels. However, to prevent any damage to existing structures, excavation beneath buildings, paved areas, or other Site structures will not be performed. Once field screening results indicate that all necessary soils have been removed, confirmatory samples will be collected from the excavation floors for analysis at an off-site laboratory, as described in the following section.

AND SIDEWALLS

Laboratory Confirmatory Samples

Laboratory confirmatory samples will be collected from the base and sidewall of each excavation as follows.

After field screening results indicate that the soils exceeding the cleanup criteria have been removed, confirmatory samples will be collected from the base and sidewall of each excavation. One confirmatory soil sample will be collected from the top of each sidewall for every 30 linear feet of sidewall, and one sample will be collected from the excavation bottom for every 900 square feet (SF) of bottom area. The sample(s) will be analyzed for the specific pesticide constituents of concern (DDT, DDD, dieldrin).

ALDRIN ?

If the laboratory analytical data for a confirmatory sample reveals levels of the constituents of concern in excess of the established cleanup criteria, an additional one foot of soil will be removed from the grid area for the sample location(s) where an exceedance occurred. The additional excavated soil will be marshalled to the designated staging area at the Pulverizing Services Site. Excavation and confirmatory sampling will continue in this manner until analysis indicates that pesticide concentrations in the remaining soils are below the established cleanup levels.

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2.7 SITE RESTORATION

This work shall consist of final backfilling and grading, cleaning up, and repairing damage. The work shall also include all operations incidental to the establishment of grass and vegetation, including sowing seed and applying fertilizer as necessary.

Backfill

Following receipt of analytical results for confirmation samples and determination that no further excavation is required in a particular area, the excavated area will be backfilled. Backfill materials will not be engineered fill and will not be compacted to engineering standards. Rather, backfill will be compacted until non-movement of the material beneath the excavating equipment is observed. Materials to be utilized for backfill will consist of certified clean fill from an off-site source.

Cleaning Up

After all construction work is complete, the areas disturbed or utilized during the project will be cleaned and left in an aesthetically pleasing condition. Unused materials will be promptly and appropriately removed from the property. Likewise, any damage to buildings, structures, fill, or other areas will be repaired in a manner acceptable to S.P. Richards.

Seeding and Revegetation

This activity will include seeding and revegetation of disturbed areas as necessary. Weather permitting, seeding of disturbed areas and revegetation will be performed as soon as possible after completion and approval of backfilling and final grading.

2.8 DEMOBILIZATION

At the completion of the work, all equipment and tools used in performing the work, as well as any unused materials, will be removed from the S.P. Richards property. All equipment and tools will be decontaminated prior to leaving the site.

2.9 SOIL CHARACTERIZATION FOR DISPOSAL

The soils staged in Building #29 at the Pulverizing Services Site will be sampled at a later date and disposed of as appropriate, based on the selected response measure identified in the proposed remedial action plan. The number of samples and analytical requirements will be determined based on the requirements of the anticipated waste disposal facility.

3.0 SCHEDULE

Field activities will begin upon USEPA approval of this Work Plan and completion of access agreements between PPG and S.P. Richards. It is anticipated that the field activities can be completed in approximately four weeks, assuming no delays caused by weather, S.P. Richards, or other parties.

If you have any questions concerning the Work Plan, please call us at 412/497-2000 or contact Pat Kelly of PPG directly at 412/ 492-5450.

Very truly yours,

A. Douglas Weeks, Jr.
Project Manager

Scot P. Lewis/RPE

Scot P. Lewis
Remediation Director

ADW/SPL/bam

cc: Pat Kelly (PPG)
Bob Lewis (Genuine Parts)
Dan Bonk (Baker)
Chuck Haefner (ICF Kaiser)

200402

SAMPLING AND ANALYSIS PLAN FOR REMOVAL ACTIVITIES AT S. P. RICHARDS PROPERTY

MOORESTOWN, NEW JERSEY

Prepared for

PPG INDUSTRIES, INC.

Prepared by

ICF KAISER ENGINEERS, INC.
Pittsburgh, Pennsylvania 15219

October 29, 1998

SAMPLING AND ANALYSIS PLAN
FOR REMOVAL ACTIVITIES AT THE S. P. RICHARDS PROPERTY
MOORESTOWN, NEW JERSEY

TABLE OF CONTENTS

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List of Attachments

1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

This Sampling and Analysis Plan (SAP) has been prepared for the removal action activities to be performed at the S. P. Richards Site (Site), which is located adjacent to the Pulverizing Services Site in Moorestown, New Jersey. The SAP was developed to ensure that reliable data is collected for field and analytical procedures associated with the project. The SAP describes the sample collection and analytical procedures to be utilized for real-time monitoring of the on-site air quality during soil intrusive activities and for the confirmatory samples to be collected from excavation floors and side walls. The SAP will be used to collect the data necessary to measure the progress towards meeting the project preliminary remediation goals.

A Quality Assurance Project Plan (QAPP) is also presented as part of the SAP. The QAPP describes the QA/QC procedures to be utilized to ensure that data and data reporting are representative of the Site conditions and will provide legally defensible results in a court of law.

2.0 SAMPLING PROCEDURES

The following sections describe the equipment and procedures to be utilized when collecting samples at the Site. In addition to the specifics described in each protocol, the following general requirements apply to all sampling activities:

- Whenever possible, samples will be collected in order of least contaminated to most contaminated so that risks of cross-contamination are minimized.
- Wherever possible, sampling equipment will be disposable or pre-cleaned, wrapped, and dedicated to one sample location on-Site. If the sampling equipment required makes this impractical, field decontamination will be performed, in accordance with Section 5.0 of this SAP.
- Sample containers and analyte-free blank water will be obtained from the analytical laboratory.
- Outer gloves will be changed between sampling locations.

2.1 SAMPLING OF DECONTAMINATION-DERIVED WASTES

Sampling of waste liquids and solids generated during decontamination activities will be performed at a later date. The wastes will be staged in Building #29 at the Pulverizing Services Site while awaiting characterization and disposal.

2.2 CONFIRMATORY SAMPLING

Scope and Application

Confirmatory sampling (field screening and lab samples) will be conducted in the excavated areas in order to ensure that the soils/sediments containing pesticide concentrations above the cleanup levels have been removed. Confirmatory samples will be analyzed for the pesticide constituents which were identified during previous investigations as being present above the established cleanup levels, in accordance with analytical Method SW-8081A. The number of confirmatory samples collected at each excavation area will be based on the size of the excavation, as described in Section 2.6 of the S. P. Richards Work Plan. Samples will be collected from the sidewalls and base of each excavated area.

Summary of Method

Confirmatory soil samples will be collected using a decontaminated stainless steel scoop, hand auger or trowel. Samples will be placed in stainless steel bowls, homogenized, and placed in appropriate sample jars.

Equipment

- Decontaminated/disposable stainless steel scoop, hand-auger, or trowel
- Decontaminated stainless steel bowl
- Sample bottles and containers
- Sample log sheets
- Tape measure

- Garbage bags
- Paper towels
- Plastic sheeting

Procedures

1. Clear any surface debris (i.e., vegetation, rocks, twigs) from the sampling location. Spread plastic sheeting on the ground surface to ensure that sampling equipment does not contact the ground surface. If the excavation cannot be entered safely, a backhoe, excavator, or similar piece of heavy equipment will be mobilized to the excavation. The soil will be excavated using the heavy equipment and will be stockpiled on the plastic sheeting.

2. Use a scoop, hand auger or trowel to collect the sample from the appropriate location on the sidewall or base of the excavation. Place the soil in the stainless steel bowl.

3. Homogenize the samples in the stainless steel bowl by stirring with the scoop or trowel.

4. Transfer the samples directly into the appropriate sample containers using the scoop or trowel.

5. Close the sample containers and affix labels to the containers.

6. Record the location of the samples in the field logbook and on a sample data sheet.

2.3 WASTE CHARACTERIZATION SAMPLING

Materials excavated at the S. P. Richards property will be transferred to the Pulverizing Services Site where they will be staged in Building #29. Waste materials placed in Building #29 will be sampled and characterized at a later date. Therefore, waste characterization sampling is not discussed in detail as part of this plan.

2.4 FIELD MEASUREMENTS

2.4.1 HNu

Scope and Application

The HNu Model 101 photoionization analyzer is designed to detect and quantity volatile organics found in the ambient air. The instrument uses a photoionization detector and serves as a total hydrocarbon analyzer, although it does not detect methane.

Summary of Method

After allowing the HNu to warm up, it can be carried anywhere to give a total non-methane organic vapor content (as benzene equivalent) of the ambient air.

Equipment

- HNu Model 101 Photoionization Analyzer with 11.7 eV probe
- Charger
- Calibration gas and fittings

Procedure

A. Calibration

The calibration of the analyzer will be checked daily using an HNu cylinder containing isobutylene.

At the factory, the Model 101 is calibrated to benzene with the span set at 9.8. In service, the HNu 101 calibration can be checked and readjusted (if necessary) using isobutylene as follows:

1. Connect the HNu to the cylinder regulator with a short piece of tubing. The calibration gas in the cylinder consists of a mixture of isobutylene and zero air. The regulator sets and controls the flow rate at a present factory value of about 250 cc/min. It is important that the tubing be clean since contaminated tubing will affect the calibration reading. Do not use the cylinder below about 30 psig as readings below that level can deviate up to 10% from the rated value.

2. With the SPAN setting and the function switch at the same positions as listed in the Application Data Sheet or Calibration Report (normally 5.0 and 0-200 ppm, respectively for a 11.7 eV probe), open the valve on the cylinder until a steady reading is obtained.

3. If the reading is the same as the recorded data, the analyzer calibration for the original species of interest is still correct.

4. If the reading has changed, adjust the SPAN setting until the reading is the same.

5. Shut off the cylinder as soon as the reading is established.

6. Record and maintain this new SPAN setting. Recalibrate the analyzer on the species of interest as soon as possible.

7. Whenever the analyzer is recalibrated, it is to be immediately checked with the isobutylene and the reading recorded. This can then be used for later checking in the field.

B. Start-up and use of the HNu

1. Attach the probe to the readout module. Align the slot on the 12-pin connector at the end of the probe cable with the tab in the 12-pin receptacle on the read out module. DO NOT FORCE THE CONNECTOR INTO THE RECEPTACLE.
2. Once the connector has been inserted into the receptacle, turn the connector clockwise until a distinct click is heard and felt.

3. Turn the function switch to the BATT position. The meter needle should deflect to the green area at the right hand side of the meter scale plate. Listen to the probe and make sure that the fan is operating. It makes a humming sound. Look BRIEFLY directly into the probe inlet and observe the lamp glow. The lamp glow will appear as a purple light.

   CAUTION: Prolonged exposure to the ultraviolet rays of the lamp will cause eye damage.

4. Turn the function switch to the STANDBY position. The fan will continue to operate. The lamp will be off. The meter needle will move to the left, out of the green area on the meter scale plate.

5. Turn the zero knob until the meter needle rests at 0. (The PI-101 can be electronically zeroed only while the function switch is in the STANDBY position).

6. Check the span setting (1.0 for 9.5 eV lamps, 9.8 for 10.2 eV lamps, 5.0 for 11.7 eV lamps) and adjust as necessary using the span control.

7. Using flexible tubing (three inches long is sufficient, one quarter inch diameter), connect the calibration gas to the probe inlet and open the valve on the regulator. Use of the probe extension is optional during this procedure. Recheck the electronic zero and adjust as necessary.

8. Once the PI-101 has been electronically zeroed, turn the function switch to the "0 - 2000" range position (X100).

9. Note any readings above background.

10. Check the battery condition as required. If the Low Battery Indicator comes on, turn the analyzer off and recharge it.

11. After use, check the battery condition.

12. Turn the function switch to the OFF position.

13. When not operating, leave analyzer in assembled condition, and connected to the battery charger.

14. When transporting, disassemble the probe and extension from the readout assembly and return equipment to its stored condition.

15. In case of emergency, turn the function switch to the OFF position.

Precautions

- The HNu may perform poorly in rainy weather, high humidity conditions, or weather less than 45 degrees Fahrenheit. Consult the Site Health and Safety Officer if these conditions are encountered.

- The HNu probe must be periodically cleaned, including the lamp bulb and probe shaft.

2.4.2 Airborne Particulates

Scope and Application

The MINIRAM is used for monitoring particulate concentrations in air. A direct read-out in mg/m^3 is obtained to indicate airborne concentrations of particulates.

Summary of Method

The MINIRAM is pointed in the direction of the breathing zone to obtain a direct reading in mg/m^3 of particulate matter.

Equipment

- MINIRAM with charger or batteries

Procedure

1. To start the monitoring operation of the MINIRAM, Press MEAS. The first readout displayed is either "GO" followed by the last concentration reading or "0.00".

2. Approximately 36 seconds after pressing MEAS the first new 10-second-averaged concentration reading is displayed. All subsequent readings are concentration values in milligrams per cubic meter, updated every 10 seconds.

3. The MINIRAM will now run in the measurement mode for 500 minutes (8 hours and 20 minutes), after which it will stop, displaying the OFF reading, retaining in storage the concentration average and elapsed time information. Once the MEAS mode has been entered this sequence can only be interrupted by pressing OFF; pressing ZERO, TWA, SA, TIME or ID# only affects the display during the time these keys are pressed, without affecting the measurement cycle. Pressing the PBK during this cycle has no effect.

4. The instrument normally operates in the 0.00 to 9.99 mg/m^3 range. Whenever a 10-second concentration exceeds 9.99 mg/m^3 the MINIRAM display automatically switches to the 0.0 to 99.99 mg/m^3 range and remains in that range as long as the measured 10-second concentration exceeds 9.99 mg/m^3, otherwise the MINIRAM reverts to its lower range display.

Precautions

- None

2.5 QUALITY CONTROL SAMPLES

The precision and accuracy of the field sampling procedures will be checked through the preparation, collection, submission and analysis of duplicate samples and rinsate blanks.

A rinsate blank will consist of two sets of laboratory cleaned sample containers. One set of containers will be filled at the laboratory with analyte-free water. At the field location, the analyte-free water will be passed over and through sample equipment previously decontaminated in accordance with Section 5.0 and placed in the empty set of sample containers for analysis. One rinsate blank will be submitted per twenty (20) samples or per week in which the sampling occurs, whichever occurs first. Rinsate blanks will be analyzed for the same parameters as the samples collected that day.

Field duplicates will be used to assess sampling and analytical precision, and will be prepared by dividing a single sample into two equal aliquots for separate analyses. Duplicate samples will be collected at a frequency of one per twenty samples, per matrix, per round of sampling.

The analytical laboratory utilized for sample analysis may follow the internal quality control procedures specified in the SW-846 organic methods. A matrix spike and matrix spike duplicate (MS and MSD) are required as part of the SW-846 quality control procedures. The field sampling crew must coordinate with the lab to ensure that an extra sample is collected as needed for the MS/MSD.

2.6 INSTRUMENT CALIBRATION AND PREVENTATIVE MAINTENANCE

Several types of instrumentation will be used at the Site during implementation of the removal action activities:

- HNu
- Miniram

Standard operating procedures for each of these instruments will be available on-site. Standard operating procedures, which include calibration procedures, for the monitoring equipment are presented in Attachment A. Field calibration of the Miniram will not be performed because it is a factory-calibrated unit and is not amenable to field calibration.

Proper preventive maintenance of field equipment is a necessary element in achieving equipment reliability and minimizing equipment downtime.

Field equipment will be properly calibrated, charged, and in good general working condition at the beginning of each day. The required equipment checks and their frequency for each type of field equipment to be used are defined in Attachment A. Any non-operational field equipment will be removed from service and returned to the equipment center, and a replacement will be obtained. Field equipment will not be repaired in the field. A spare water level indicator will be kept in the field. Maintenance records will be maintained for each field instrument. These records will be reviewed prior to instrument use in the field to ensure that all maintenance and calibration are up-to-date.

Field instruments will be properly protected against inclement weather conditions during the field investigation. Each instrument is specially designed to maintain its operating integrity during variable temperature ranges that are representative of ranges that will be encountered during cold-weather working conditions. At the end of each working day, field equipment will be decontaminated, taken out of the field, and secured in a cool, dry room for overnight storage.

In addition, the following general preventative maintenance guidelines will be followed:

- Be certain each instrument is working properly before going to the field. Perform a calibration to be sure it falls within the right range.
- Make sure the proper electrical power is available in the field.
- Know what you are doing before you operate any instrumentation. Get instruction or help if you are unsure.

- Do not shove the HNu probe into the ground.
- If the instrument is battery operated, have a spare battery. If it requires charging, be sure to charge it each night.

3.0 SAMPLE HANDLING, STORAGE AND SHIPMENT

3.1 SAMPLE NUMBERING SYSTEM

An accurate sample numbering system is essential for sample tracking and matching of results with sample locations. A unique number will be assigned to each sample collected. The sample number will be recorded correctly on the sample container, field logbook and chain-of-custody record. Sample numbers will be generated as follows:

1. Sample numbers will begin with the prefix PPGSP to indicate PPG and the S. P. Richards Site.

2. The sample prefix will be followed by a sample-type code, as follows:

   S – Soil
   SD - Sediment

3. A three-character sample identifier will follow the sample-type code. The three-character sample identifier will be assigned sequentially by sample type.

4. Examples:

   PPGSP-S-002 Second soil sample taken.

3.2 PRESERVATION AND HOLDING TIME

Soil samples for pesticide analysis will be cooled to 4°C upon collection. No other preservation is required.

3.3 STORAGE AND HANDLING

Rinsate blanks, along with the associated set of bottles, will be prepared at the laboratory performing the analysis. The blanks will be shipped on ice with the bottles under chain of custody to the field sampling team. Upon receipt, the field sampling team will sign the chain of custody and check that the ice has not melted. The ice will be replenished if necessary. The blanks will be kept on ice in a secure area of the field office until used.

The clock for sample holding time begins upon sample collection. Samples will be stored at 4°C prior to analysis. Following analyses the laboratory will store the samples at room temperature in a secure area for 12 months.

Once a sample has been collected, the sample will be preserved if appropriate and either be secured in a locked vehicle, locked trailer, custody sealed cooler or in visual site of the person(s) assuming the chain of custody until shipment to the laboratory.

3.4 PACKAGING AND SHIPPING

This procedure is applicable to packing and shipping the environmental samples that will be collected during the removal action activities in accordance with Department of Transportation (DOT) shipping and labeling requirements and prohibitions. All personnel responsible for sample shipment must be trained in

accordance with applicable DOT training requirements. Proper packing/shipping is critical to the sample chain of custody, as well as protection of the shipper and carrier. The following applies to samples not suspected to contain potentially hazardous constituents. For all other shipping, consult applicable guidance document. If samples are discolored, odorous, or contain non-aqueous phase materials, applicable shipping guidance should be considered.

1. Prepare containers for shipment.

- Affix "This Side Up" and appropriate shipping labels on each of the containers.
- Place mailing label with laboratory address on top of containers.
- Assign chain-of-custody records and corresponding custody seals to respective shipping containers.

2. Prepare the sample bottles.

- Check to see that lids are on tight and that bottle labels are firmly affixed and labeled.
- Spray the bottles with tap water and wipe with a paper towel.

3. Arrange the sample containers in front of their assigned shipping containers.

4. Seal each sample container in a separate zip-lock plastic bag and place the sample containers in the shipping containers. Appropriately sized commercially available plastic bags may be used in the event that the sample bottle will not fit in a zip-lock bag.

5. Place bags of ice directly on and around the sample containers. Ice should be double-bagged in a zip-lock bag. Alternatively, blue ice blocks may be used.

6. Fill the remaining space with vermiculite absorbent packing material.

7. Sign the COC form (or obtain the signature) and indicate the time and date the samples are relinquished to the overnight carrier.

8. Seal the proper COC copy in a zip-lock bag and tape it to the inside lid of the container.

9. Close the lid and latch the container.

10. Carefully peel the custody seals from their backings and place them intact over the front and back edges of the shipping container. Cover the seals with clear protection tape.

11. Tape the container shut on both ends, making several complete revolutions with strapping tape (do not cover the custody seals).

12. Address the shipment and relinquish the shipping container(s) to the overnight carrier.

13. Telephone the laboratory on the day of shipment. Provide the following information:

- Your name;
- Project name;
- Number of samples sent to the laboratory for analysis; and
- Airbill numbers.

4.0 DOCUMENTATION AND SAMPLE CUSTODY

4.1 FIELD DOCUMENTATION

To ensure a complete and reconstructible record of field activities, the documentation procedures described in this section shall be followed. A field logbook will be used to record all information particular to each day's activities. This information will include:

- Persons on-Site and responsibility
- Health and safety data
- Weather conditions
- Equipment calibration information
- Summary of day's activities
- Field observations

Specific sampling information (i.e., sample number, date, time, etc.) will be recorded on sample log sheets (Refer to Attachment B). The sample log sheets will be numbered consecutively to follow the sequence of sampling. Use of sample log sheets will be recorded in the field log book.

The field sampling crew may document the site conditions and features as well as sample collection using 35 mm photographs. Each photo will be documented in a log. This photo log will include specific information for each photograph, including the Site name, date photo was taken, photographer, activities included in the photo, and the direction the photographer was facing when the picture was taken.

4.2 SAMPLE CUSTODY PROCEDURES

After collection, identification, and preservation, sample custody will be maintained by field personnel until it is released for shipment and is delivered to the analytical laboratory. All samples will be accompanied by a chain-of-custody record form. Following the completion of the chain-of custody form with all appropriate information (i.e., date, time, sample matrix, number of containers, analytical parameters, and sample identification number), the original chain-of-custody will be placed in the sample shipping package. The additional copy(s) will be retained for field records.

5.0 DECONTAMINATION PROCEDURES

5.1 SAMPLING EQUIPMENT

This procedure is applicable for any equipment that will be used to collect samples for chemical analysis. Whenever feasible, individually wrapped, disposable field equipment will be dedicated to a particular sampling point and discarded after use. All disposable sampling equipment will be collected and staged for subsequent off-Site disposal.

Decontamination fluids will be temporarily collected in plastic tubs, buckets or similar containers. Upon completion of each individual sampling activity, the decontamination fluids will be transferred to 55-gallon drums or other appropriate containers. Decontamination fluids will be staged at a designated, secure staging area on the Pulverizing Services Site (Building #29). The containerized decontamination fluids will be analyzed at a later date, as necessary, to assure disposal in accordance with all applicable local, State and Federal regulations.

Hand tools will first be scrubbed with a brush to remove gross contamination. The tools will then be immersed into water containing a non-phosphate detergent and scrubbed. Following a tap water rinse, the equipment will be rinsed with a 10% nitric acid solution (NO_3) and then with distilled, deionized water. Next, a reagent grade isopropanol rinse will be performed, followed by a second distilled, deionized water rinse. The equipment will be allowed to air dry. If it will not used immediately, the decontaminated sampling equipment will be wrapped in aluminum foil.

5.2 HEAVY EQUIPMENT

Decontamination of heavy equipment (i.e., excavator, backhoe) will be performed at a designated vehicle/heavy equipment decontamination pad.

Following excavation activities at each area of concern, the equipment will be positioned at the vehicle decontamination area. The equipment will be decontaminated using high pressure water. All decontamination fluids generated will be collected and containerized. Following analysis, the fluids will be disposed off-Site at an appropriate disposal facility.

5.3 PERSONNEL DECONTAMINATION

Decontamination of personnel will be performed in accordance with the Site Health and Safety Plan.

5.4 FIELD MEASUREMENT EQUIPMENT

This procedure is applicable to decontamination of field measurement equipment, such as photoionization detectors and aerosol monitors. The field measurement equipment will be wiped with a paper towel or brush to remove all visible contamination. A mild tap water/detergent solution will be used to scrub the piece of equipment, which will then be rinsed with tap water followed by distilled, deionized water.

6.0 LABORATORY PROCEDURES

6.1 ANALYTICAL PROCEDURES

Confirmatory soil and sediment samples will be collected and analyzed to ensure that soils/sediments containing pesticides in excess of the established cleanup levels have been removed. Samples will be analyzed for pesticides (specific pesticides of concern include DDT, dieldrin, DDD, and aldrin) using Method SW-8081A. Samples will be analyzed by EMSL Analytical, Inc. of Westmont, New Jersey (NJ Certification #04653). All analytical procedures, documentation and record maintenance will be in accordance with ASTM, USEPA, and other industry standard methods, as applicable.

6.2 REPORTING REQUIREMENTS

Data obtained during the analysis of the samples will be used to ensure that all soils containing contaminant concentrations in excess of the established cleanup levels have been removed. Therefore, the laboratory will be required to provide a CLP type data package, including Forms 1-10 and all raw data, as needed, to check and recalculate analytical results.

7.0 QUALITY ASSURANCE OBJECTIVES

7.1 DATA VALIDATION

Once the data package is received from the laboratory, the analytical results and pertinent QA/QC data will be compiled onto standardized data spread sheets. The spread sheets will serve as basic reference sheets for data validation, as well as for project data use. Prior to releasing data for use by project staff, each data package will undergo a formal validation procedure to examine laboratory compliance with QA requirements and other factors which determine the quality of the data.

7.1.1 SW-846 Organic

Samples collected during the removal activities will be analyzed for pesticides (organics) using SW-846 methods. All such data will be validated to verify that it is adequate for its intended use. The laboratory will be required to generate and deliver a full "CLP-type" data package for all analyses, while the validation will be performed in accordance with the National Functional Guidelines for Evaluating Organic and Inorganic Analyses, as applicable to SW 846 methods.

At a minimum, the following factors will be compared with the criteria specified in the USEPA National Functional Guidelines for Evaluating Organic Analyses.

Organics

Sample holding times
Sample chain-of-custody
Initial and continuing calibration
Method blanks
Detection limits
Laboratory blank contamination
Surrogate spike recoveries
Matrix spike/duplicate analysis
Field duplicate analysis
Rinsate blank contamination
Pesticide instrument performance

7.1.2 Data Assessment

Following data validation, the data will be examined for Site-specific factors which may interfere with chemical analyses or utilization of the results. Some of the factors which will be assessed include:

- Adverse matrix effects on the analytical recoveries.
- Nature and cause of extraneous contamination not attributable to laboratory contamination.
- Reproducibility of results for site-specific media in relation to stated precision goals.
- Adequacy of the data base in terms of numbers of samples, critical data points, and representativeness for meeting stated objectives.

200419

HEALTH AND SAFETY PLAN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Prepared for

PPG INDUSTRIES, INC.

Prepared by

ICF KAISER
Pittsburgh, Pennsylvania 15222

October 29,

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DISCLAIMER

This Health and Safety Plan (Plan) was prepared to be used at the Pulverizing Services Site by ICF Kaiser personnel performing specific, limited scopes of work. It was prepared based on the best available information regarding the physical and chemical hazards known, or suspected, to be present on the project site. It is not possible in advance, to discover, evaluate, and protect against all possible hazards which may be encountered during the duration of this project. Adherence to the requirements of this Plan will significantly reduce, but not eliminate, the potential for occupational injury and illness at the project site. The guidelines contained in this Plan were developed specifically for the project site described herein, and should not be used at any other site without the review and approval of a qualified health and safety professional.

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1.0 INTRODUCTION

1.1 PURPOSE

This Health and Safety Plan has been prepared in accordance with the Occupational Safety and Health Administration's Safety and Health Standards 29 CFR 1910.120, 29 CFR 1926, the Hazard Communication Standard 29 CFR 1910.1200 and ICF Kaiser Engineers' Safety and Health Program Requirements. The purpose of this Health and Safety Plan is to establish safe procedures and practices for ICF Kaiser personnel engaged in field activities at the Pulverizing Services Site (Site) located in Moorestown, New Jersey.

Site activities require a high level of safety planning. Adequate planning is the first and most critical element in controlling employee exposure to hazardous materials and situations. Accordingly, proper safety techniques and safety equipment are an integral part of each specified task of the project. This plan addresses those safety procedures and equipment which shall be utilized to minimize the probability of employee injury or chemical exposure during on-site activities.

This plan is based on limited information available concerning the possible chemical and physical hazards found on the Site. As more data concerning the nature and concentrations of contaminants becomes available, the health and safety plan will be modified accordingly. The form for completing the Health and Safety Plan Addendum/Revision is presented in Attachment A.

1.2 BACKGROUND INFORMATION

Location and Description[1]

The Pulverizing Services Site is comprised of approximately 24 acres located in an industrial park at 332 New Albany Road in Moorestown, Burlington County, New Jersey. A Site Location map is presented as Figure 1-1. The Site is located 3/4-mile due east of the North Branch of the Pennsauken Creek. Land use immediately adjacent to the Site is comprised of commercial, light industrial, and residential areas as follows:

North - The Site is bounded to the north by Crider Avenue, across which is located a manufacturing facility;

South - The Site is bounded to the south by railroad tracks (owned by BB&O), across which are located several residences;

East - The Site is bounded to the east by active industrial facilities; and

West - The Site is bounded to the west by active residential, commercial, and industrial properties.

The entire Site is subdivided into three parcels (Areas A, B, and C), with New Albany Road separating Area B from Areas A and C.

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[1]Summarized from the Phase II Site Investigation Report, November 10, 1995, McLaren/Hart Environmental Engineering Corporation..

FIGURE 1-1

PULVERIZING SERVICES SITE MOORESTOWN, NEW JERSEY	SITE LOCATION MAP
ICF KAISER ENGINEERS PITTSBURGH, PA	DATE: 02/03/98 | DR.: D. EVANS SCALE: AS SHOWN | FILE NAME: 10151005

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The Site is an inactive pesticide formulating facility. A summary of Site ownership is presented below.

1935 to 1946 - The plant was operated by the International Pulverizing Company;

1946 to 1948 - The plant was owned and operated by Micronizer Company, a subsidiary of Freeport Sulfur Company;

1948 to 1963 - The plant was owned and operated by PPG Industries, Inc.;

1963 to 1979 - The plant was owned and operated by Pulverizing Services, Inc. Operations reportedly ceased in 1979 due to labor problems; and

1979 to Present - The plant has been inactive and unoccupied.

During the operating period of the plant, operations were primarily limited to Area A and involved the grinding, micronizing, and blending of pesticides. According to historical reports, operations were initially limited to formulation of inorganic pesticides such as lead arsenate, calcium arsenate, sulfur, and tetrasodiumpyrophosphate. In later years, synthetic organic pesticides such as dichlorodiphenyltrichloroethene (DDT), aldrin, malathion, dieldrin, lindane, rotenone, and n-methyl carbamate (Sevin or Carbaryl) were reportedly formulated. The active pesticide ingredients were not manufactured at the Site, but instead were brought to the Site, ground, blended, and packaged for distribution under various labels.

Site literature (Pulverizing Services, Inc.) indicated that since 1935, only dry chemical processing was conducted at the Site. The services provided included the grinding (using fluid energy such as compressed air), densifying, packaging, warehousing, and distributing of products to support industries such as plastics, pharmaceuticals, and pesticides.

During the 1950's and early 1960's (USEPA, February 1988), waste material was reportedly disposed of to the north of the main production buildings in several trenches. In addition, historical project files indicate that a fire occurred in 1964. The ash and debris from the fire was reportedly placed in a trench north of the main production buildings in Area A.

Commercial operations at the plane ceased in 1979. Former plant production facilities within Area A were decommissioned (by removing interior facilities) and were boarded shut in 1983. The building are still present at the Site. In May 1988, security fencing was placed around Areas A and C. A removal of chemicals from within the Site buildings was performed under the direction of USEPA in 1990. In the spring of 1993, security fencing was installed around Area B. A removal of surface soils occurred from adjacent properties in 1996.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 CHAIN OF COMMAND

The organization of this project is integrated into the existing ICF Kaiser corporate and project management structure. Each element of the ICF Kaiser project organization is discussed below.

Health and Safety Director

The Health and Safety Director (HSD), Jerry Joy, CSP CIH, has overall corporate responsibility for health and safety issues during project activities. He will ensure that corporate standards are applied during the project and that the project meets all established health and safety requirements.

Project Manager

The Project Manager, A. Douglas Weeks, Jr., is the primary point of contact with the PPG Facility Coordinator, and will have overall responsibility for the project. The Project Manager, along with the Project Health and Safety Officer, can require corrective action for work not performed in accordance with the Site Health and Safety Plan.

Project Health and Safety Officer

The Project Health and Safety Officer (PHSO), Daniel J. Welshons, CSP, is responsible for aiding the HSD in the performance of his normal duties. The duties include: maintaining health and safety records; providing guidance for on-site health and safety developments; approving health and safety plan addendum/revisions; and communication between on-site and corporate health and safety personnel. The PHSO reports directly to the HSD.

Site Health and Safety and Officer

The Site Health and Safety Officer (SHSO), designated upon initiation of field activities, is responsible for on-site enforcement of the policies and provisions contained in the Plan. The SHSO will function as the communications liaison between project and corporate health and safety and as such reports directly to the PHSO. The SHSO will conduct safety briefings before on-site activities begin. The briefings will include such topics as on-site hazards, site-specific safety and emergency procedures, etc. In addition, the SHSO can stop work if site activities pose a hazard to site workers.

2.2 CONTRACTOR RESPONSIBILITIES

All personnel performing work on-site are responsible for compliance with all applicable Federal, State and local statutes, ordinances, and regulations regarding health and safety. Each contractor shall prepare and conform to a health and safety plan which provides planning and procedures which are at least as stringent as this plan. Each contractor must identify a lead individual responsible for the health and safety compliance of their employees, lower-tier subcontractors and consultants. This person will be responsible for reporting to the SHSO, and for demonstrating compliance with the health and safety procedures.

In conformance with the Department of Labor, OSHA Hazardous Waste Site Operations (29 CFR 1910.120), each contractor employee proposed for on-site activities must participate in a medical monitoring program, must be certified for hazardous waste field work by a licensed physician, and must have successfully completed the required health and safety training.

2.3 VISITORS

Authorized visitors to any work location on the Site will be briefed by the SHSO on the hazards associated with the work area. Visitors will be escorted at all times while visiting the work location and will be responsible for compliance with the requirements specified in this Site HASP.

3.0 SCOPE OF WORK

3.1 GENERAL

The following tasks will be performed as part of the removal action. In general, these tasks will include site preparation, surveying, staging area construction, decontamination area construction, fence repair, clean haul road construction, soil and sediment excavation, backfilling, waste removal, decontamination, and Site cleanup.

3.2 SITE PREPARATION

3.2.1 Clearing and Grubbing

Clearing and grubbing may be required in some areas prior to soil excavation. Clearing and grubbing may involve cutting weeds and other high grasses and/or removing small to medium size trees from the area to be remediated.

Potential health and safety hazards associated with clearing and grubbing may include the physical hazards outlined in Section 4.2,exposure to various plants, animals and insects that may be poisonous. Personnel will be required to don the appropriate level of personal protective equipment (PPE) for this activity.

3.2.2 Preparation of Staging Areas

Staging areas will be identified and prepared for the staging of soil, equipment and materials, debris, and other waste materials generated during the removal action activities. These areas will be located away from normal work areas to the extent possible to insure that Site activities are able to proceed.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.2.3 Construction of Vehicle Decontamination Area

A vehicle decontamination area shall be constructed to allow vehicles and large equipment to be decontaminated prior to leaving the Site to prevent the spread of contamination.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.2.4 Security Fence Inspection and Repair

The fence surrounding the Site will be inspected to ensure that openings or breaks in the fence, which may allow unauthorized personnel to access the Site, do not exist. The fence will be repaired by the Contractor, as necessary.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.2.5 Clean Haul Roads

Clean haul roads will need to be constructed and maintained to allow trucks and hauling vehicles to enter and exit the Site without the need for decontamination.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2, as well as the potential for exposure to the chemical constituents of concern outlined in Section 4.1. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.3 SURVEYING

Surveying activities will be conducted at the Site to establish the boundaries of areas requiring excavation. The surveying will be conducted by a surveyor licensed in the state of New Jersey. The surveyor will be required to have received appropriate training in accordance with 29 CFR 1910.120.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2, as well as the potential for exposure to the chemical constituents of concern outlined in Section 4.1. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.4 BUILDING 29 WASTE REMOVAL

The stockpiled soils within Building 29 will be removed from the Site and transported to an appropriate disposal facility. The material will be loaded into hauling trucks using a front end loader or other appropriate equipment.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2, as well as the potential for exposure to the chemical constituents of concern outlined in Section 4.1. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

3.5 SOIL AND FORMER DISPOSAL TRENCH EXCAVATIONS

Excavation activities will be conducted using an excavator in Areas A, B, C, and other potential off-site areas. The Area A excavations will involve removing soils from identified hot spots and debris (soils, drum fragments, etc.) from the former disposal trench. Excavation activities in Areas B and C and the potential off-Site areas include the removal of soils and sediments from identified hot spots and drainage ditches. Excavated soils and debris will be transferred to a designated staging area for subsequent characterization and off-Site disposal.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2 as well as the potential for exposure to the constituents of concern outlined in Section 4.1. Entry

into excavations greater than 4 feet in depth by project personnel is prohibited. Personnel performing excavation work will be required to wear the appropriate level of respiratory and personal protective equipment. ICF Kaiser Procedure S&H-107, Excavation and Trenching Safety (Attachment E), will be followed during this activity.

3.6 WASTE CHARACTERIZATION

Once the removal activities have progressed such that waste streams have been segregated, sampling and waste characterization will be performed to determine disposal requirements for the various waste streams that will be generated. Materials to be sampled may include soils, sediments, miscellaneous debris, residuals from containers, and decontamination wastes.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2, as well as exposure to the constituents of concern outlined in Section 4.1. Personnel performing this work will be required to wear the appropriate level of respiratory and personal protective equipment.

3.7 SITE RESTORATION

Following completion of the removal activities, Site restoration will occur. Site restoration will include general Site cleanup and reseeding areas of the Site which have been disturbed.

The potential hazards associated with this work include the physical hazards outlined in Section 4.2. Personnel performing the work will be required to wear the appropriate personal protective equipment (PPE).

4.0 HAZARD EVALUATION

This section presents chemical and physical hazard information to be used for the development of health and safety protocols for on-site activities. The goals of the hazard evaluation are two-fold: 1) to summarize available chemical information and the corresponding impacts on worker health and safety; and 2) to adequately describe the physical hazards associated with the work to be performed at the Site. This information is important in the development of action levels to be used for the determination of levels of respiratory and dermal protection. Industrial hygiene air sampling and the use of real-time air monitoring instruments used in conjunction with the judgement of the Site Health and Safety Officer, will provide the basis for upgrading or downgrading levels of protection. Industrial hygiene samples may be used to validate real-time instrument measurements. Table 4-1, Constituents of Concern, presents the constituents which have been identified during previous investigations as being present at the Site.

4.1 CHEMICAL HAZARD REVIEW

Based on the available health and safety information, the overall risk of exposure to chemical hazards for on-site workers during performance of work under this plan is moderate. The primary risks of exposure to chemical hazard are associated with inhalation, accidental ingestion, skin absorption and direct contact with contaminated soil and construction debris.

4.2 PHYSICAL HAZARD REVIEW

The following physical hazards must be recognized and controlled during field activities:

- Operation of heavy equipment;
- Confined space entry;
- Heat stress;
- Cold stress;
- Noise;
- Manual lifting;
- Container handling;
- Excavations;
- Electrical equipment;
- Welding and burning;
- Ladders; and
- Pressure washing.

4.2.1 Operation of Heavy Equipment

Precautions must be taken when working around heavy equipment, such as excavators and front-end loaders. The movement of this equipment from location to location within the Site is of particular concern. All equipment operators must obey site-specific safety requirements, and traffic control must be strictly followed. Except where electrical distribution and transmission lines have been de-energized and visibly grounded, excavators, and other heavy equipment will be operated near power lines in accordance with the guidelines specified in 29 CFR 1926.550 (Cranes and Derricks).

TABLE 4-1

CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter	Media (see note 1)	Maximum Conc. (see note 2)	Symptoms of Exposure	OSHA Permissible Exposure Limits
Benzene	SE	0.098 ppm	Irritation of eyes, skin, nose, and respiratory system, giddiness, headache, nausea, fatigue, lassitude, dermatitis, [carc]	1 ppm
Carbon Tetrachloride	GW	10 ppb	Irritation of the eyes and skin,	10 ppm
Chlorobenzene	SE	0.098 ppm	Irritation, eyes, skin, nose, drowsiness, incoherent, CNS depression	75 ppm
Chloroform	GW	15 ppb	Irritation of eyes and skin; dizziness, mental dullness, nausea, confusion, headache, fatigue,	C 50 ppm
Ethylbenzene	SE	0.098 ppm	Irritation of yes and skin, mucous membrane headache, dermatitis, narcosis	100 ppm
Trichloroethene	SE	2,600	Irritation of eyes, skin, headache, vertigo, visual distortion, fatigue, giddiness, nausea, vomiting, dermatitis, [carc]	100 ppm
Tetrachloroethene	GW	140 ppb	Irritation of eyes, nose and throat, nausea, flush face and neck, vertigo, dizziness, incoherent, headache, [carc]	100 ppm
Benzo(a)anthracene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Benzo(a)pyrene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Benzo(b)fluoranthene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3

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TABLE 4-1

CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter	Media (see note 1)	Maximum Conc. (see note 2)	Symptoms of Exposure	OSHA Permissible Exposure Limits
Benzo(k)fluoranthene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Butylbenzylphthalate	SE	0.57 ppm	Irritation of eyes, nose and throat, headache, drowsiness, drunkeness	NE
Chrysene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Fluoranthene	SE	45 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Phenanthrene	SE	10 ppm	Dermatitis, bronchitis, [carc]	0.2 mg/m3
Pyrene	SE	10 ppm	Irritation of skin	0.2 mg/m3
4,4'-DDT	SE/S	6800 ppm	Irritation of eyes, nose and throat, dizziness, headache	1 mg/m3
DDD	S	270 ppm	Nausea, vomiting, diarrhea, headache, dizziness, convulsions	NE
DDE	S	270 ppm	Ingestion problems, menstrual disorders	NE
DDT	SW/GW/S/SE	27200 ppm	Irritation of eyes, nose and throat, dizziness, headache	1 mg/m3
Aldrin	S	6.9 ppm	Headache, dizziness, nausea, vomiting, myoclonic, jerks of limbs	0.25 mg/m
Alpha-BHC	SW/GW	310 ppb	Irritation	NE
Dieldrin	SW/GW/S/SE	2200 ppm	Headache, dizziness, nausea, vomiting, limb jerks, convulsions, coma	0.25 mg/m3
Beta-Gamma	GW/SW	9 ppb	Irritation	NE

TABLE 4-1

CONSTITUENTS OF CONCERN

PULVERIZING SERVICES SITE
MOORESTOWN, NEW JERSEY

Parameter	Media (see note 1)	Maximum Conc. (see note 2)	Symptoms of Exposure	OSHA Permissible Exposure Limits
Delta-Gamma	GW/SW	16 ppb	Irritation	NE
Gamma-BHC	GW	35 ppb	Irritation	NE
Lindane	GW/SW	4 ppb	Irritation of eyes, skin, nose and throat, headache, nausea	0.5 mg/m3
Malathion	GW	23 ppb	Nausea, vomiting, diarrhea, stomach pain, chest pain, headache, dizziness	NE
Pentachloronitrobenzene	SE	48 ppm	Irritation, bluish skin color, lung congestion, nausea, vomiting	NE
Sevin	GW	14500 ppb	Nausea, vomiting, diarrhea, stomach pain, chest pain, headache, dizziness	5 mg/m3
Arsenic	S/GW/SW	132 ppm	Irritation of skin, possible dermatitis, respiratory distress, diarrhea	0.01 mg.m3
Cadmium	SW/GW	49.6 ppb	Irritation of eyes, nose and respiratory system, headache, dizziness, weakness, giddiness, confusion, nausea, vomiting	0.005 mg/m3
Chromium	S/W/SW	96.5 ppm	Irritation of eyes, skin and lungs	0.5 mg/m3
Lead	S/W/SW	480.5 ppm	Weakness, lassitude, insomnia, facial pallor, constipation, abdominal pain, gingival lead line	0.05 mg/m3

1. S: soil; GW:Groundwater; SW: Surface Water; SE: sediment
2.Maxmium concentration is largest detection of soil, groundwater, surface water and sediment.
NE = Not Established

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4.2.2 Confined Space

It is not expected that confined space entry will be performed as part of the removal action. However, if confined space entry becomes required, ICF Kaiser procedure S&H-101, Confined Space Entry (Attachment E), will be followed. Deviation from the requirements of this procedure will not be permitted.

4.2.3 Heat and Cold Stress

4.2.3.1 Heat Stress

Heat stress may be of concern during Site activities, depending upon the ambient temperature. One or more of the following control measures may be used to help control heat stress:

- Provide adequate liquids to replace lost body fluids. Employees must replace water and salt lost from sweating; therefore, they must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

- Replacement fluids may be a 0.1 percent salt water solution, commercial mixes such as Gatorade or Quick Kick, or a combination of these and fresh water.

- Establish a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts for workers or earlier/later work schedules.

- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.

- All breaks are to be taken in a shaded rest area.

- Employees shall not be assigned other tasks during rest periods.

- All employees shall be informed of the importance of adequate rest, acclimatization, and proper diet in the prevention of heat stress.

ICF Kaiser procedure S&H-208, Hot Environments (Attachment E), will be implemented, as necessary, during Site activities.

4.2.3.2 Cold Stress

During the winter months, cold stress is an occupational hazard which must be addressed.

- Persons working outdoors in temperatures at or below freezing may be subject to frostbite. Exposure to extreme cold, even for a short time, may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volumes ratio such as fingers, toes, and ears, are the most susceptible.

- Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

  -- Frost nip or initial frostbite: characterized by sudden blanching or whitening of skin.

  -- Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.

  -- Deep frostbite: tissues are cold, pale, and solid; extremely serious injury.

- Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: 1) shivering, 2) apathy, listlessness, sleepiness, and sometimes rapid cooling of the body to less then 95°F, 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, 4) freezing of the extremities, and finally 5) death.

- Thermal socks, long cotton or thermal underwear, hardhat liners and other cold weather gear can aid in the prevention of hypothermia.

- Blankets, warm drinks (other than caffeinated coffee) and warm break areas are essential.

- An overall goal is to keep from getting wet. If one does get wet, dry off and change clothes.

- Cold stress training may be appropriate for work at the Site.

- All eyewash/showers shall be winterized for flow in cold weather.

- Because of dangerous or severe temperature and wind conditions, operations may be suspended by the SHSO.

ICF Kaiser procedure S&H-207, Cold Environments (Attachment E), will be implemented, as necessary, during Site activities.

4.2.4 Noise

The use of hearing protection may be required at certain times due to activities which require extensive use of heavy equipment and/or noisy portable equipment. Hearing protection will be required when sound pressure levels in work areas or on equipment exceed 85 db (A-weighted scale). ICF Kaiser procedure S&H-204, Hearing Conservation Program (Attachment E), will be implemented. Training on the proper use of hearing protection will be conducted as a part of the health and safety briefing conducted by the SHSO prior to on-site work.

4.2.5 Manual Lifting

Activities may require personnel to move large, heavy objects by hand. The human body is subject to severe damage in the forms of back injury and hernia if caution is not observed when handling, lifting, or moving these large, heavy objects.

General Rules

- Get a good footing
- Place feet about one shoulder width apart
- Bend at knees to grasp weight
- Keep the back straight
- Get a firm hold
- Lift gradually by straightening the legs
- If weight is uncomfortable to lift, get help

4.2.6 Container Handling

Containers such as drums may be encountered during excavation of the former disposal trench. Prior to moving or sampling any drums, the following assessment must be performed:

- Does the drum show any signs of instability (visible emissions, sounds such as hissing or bubbling);
- Is the drum physically intact;
- Is there any evidence of pressure within the drum (top or sides distended, popping sound);
- Photograph the drum;
- Note the drum size and any identifying markings (labels, colors, etc.); and
- Note the drum type and material of construction (plastic drums generally contain corrosives or oxidizers, steel drums generally contain petroleum derivatives or organic solvents, drums constructed of stainless steel or other exotic metals often contain reactive materials).

Drums which are encountered that are found to exhibit active qualities (i.e., bulging sides, top or bottom, hissing or bubbling sounds, visible emissions) will be left in place in the test pit or trench and the appropriate equipment will be mobilized to handle the drum and its contents. Should deteriorating drums which contain liquids be encountered, the liquids will be pumped into a new drum (overpack container), and then the deteriorating drum will be removed and placed inside the overpack drum along with the removed liquids. Structurally intact drums or other containers that do not exhibit reactive qualities will be carefully removed from the excavation.

4.2.7 Excavation Areas

Contractors performing excavation operations must be aware of and protect on-site personnel from the hazards associated with this work. The hazards include:

- Collapse of excavation side walls;
- Personnel or equipment falling into excavated areas;
- Water seepage, which may cause hydrostatic pressure on the walls;

- Underground utilities (high-pressure gas lines, sewer lines, electrical lines, etc.); and
- Punctured containers which may contain hazardous materials.

The contractor performing excavation operations must also make the following considerations to protect on-site personnel:

- The nature of soil structure (rock, clay, sand, etc.). Sloping requirements for trench walls vary depending on the type of soil.
- Moisture content of the soil. Air slack (a conditions which occurs when trench walls dry out) may cause soil to become unstable and subject to failure.
- Excavations subject to vibration (from adjacent train and traffic movement) must be guarded to prevent loosened materials from falling into the hole and prevent wall failure.
- Adequate protection for on-site personnel, equipment, and vehicles must be provided in the form of barricades, guardrails and warning signs.
- Excavations shall be regularly inspected, particularly after rainstorms or other hazard-increasing occurrences such as freezing and thawing.
- Excavation atmospheres must be continuously monitored for the presence of combustible gases.
- Excavations shall be monitored for water infiltration and equipment shall be available to pump free liquids from work area to prevent flooding.

ICF Kaiser procedure S&H-107, Excavation and Trenching Safety (Attachment E), will be implemented as appropriate.

4.2.8 Electrical Equipment

All electrical work, installation, and wire capacities shall be in accordance with the pertinent provisions of National Electrical Code and ICF Kaiser procedure S&H-110, Portable Electrical Equipment (Attachment E).

It is mandatory that Ground Fault Circuit Interrupters (GFCI) be used on all 120-V, single-phase, 15/20-amp receptacle outlets used for temporary power.

All switches should be enclosed and grounded. Panel boards should have provisions for closing and locking the main switch and fuse box compartment. All switches will be labeled to show the device or area that the switch serves.

Cables, including welding cables, passing through work areas shall be covered or elevated to protect them from damage and to eliminate hazards to employees.

Extension cords used with portable electric tools and appliances shall be three-wire and grounded. Plugs shall conform to the type and configuration required by the OSHA Construction Standards.

Suitable means shall be provided for identifying all electrical equipment and circuits, especially when two or more voltages are used on the same job. All circuits shall be marked for the voltage and the area of service they provide.

Flexible electrical cord shall be continuous lengths without splices. Suitable molded or vulcanized splices may be made; however, the insulation shall be equal to the cable being spliced and wire connections soldered.

4.2.9 Welding and Burning

A suitable, approved fire extinguisher shall be ready for use within 30 feet of any location where welding is performed. Screens, shields, or other safeguards shall be provided for the protection of personnel or materials below or otherwise exposed to sparks, falling objects, or the direct rays of the arc.

The welder shall wear approved eye and head protection. Welder assistants shall wear protective glasses.

Electric welding equipment shall meet the requirements of the National Electric Code. Welding practices shall comply with applicable regulations and specific Burning and Welding General Safety Rules.

When welding or burning is conducted, the operation must be reviewed by the SHSO for exposure to combustibles. A hot work permit will be issued. A fire watch may be required.

Mechanical ventilation and/or respiratory protection shall be provided for welding, cutting, and heating of metals with toxic substances or when in confined spaces.

When gas cylinders are stored, moved, or transported, the valve protecting cap shall be in place and cylinders must be tied off.

When cylinders are hoisted, they shall be secured in an approved cage or basket.

All cylinders shall be stored, transported, and used in an upright position. If the cylinder is not equipped with a valve wheel, a key shall be kept on the valve stem while in use.

All hoses must be fitted with a reverse-flow check valves.

An approved fire extinguisher shall be readily available (within 30 feet) in the event of fire.

Appropriate personal protective equipment, such as burning glasses, shields, and/or gloves must be used.

ICF Kaiser procedure S&H-112, Welding, Cutting, and Hot Work (Attachment E), will be followed, as appropriate.

4.2.10 Ladders

Ladders, if not properly used, can be dangerous and a cause for an accident. Some common dangers include: improper climbing or descending, failure to secure top and bottom, structural failure, and

carrying objects while using ladders. Ladders shall be inspected periodically at the same frequency as for small tools. Refer to Subpart "X" of the amended OSHA regulations for greater detail on ladder safety requirements. ICF Kaiser procedure S&H-111, Use, Handling, and Storage of Ladders (Attachment E), will be followed during Site activities.

Portable Ladders

Makeshift ladders shall not be permitted on the project. Only ladders of good quality material, properly designed and constructed, shall be used.

Ladders must not be placed on boxes to increase their height. A substantial base is a must.

Portable straight ladders must be properly positioned for use. Positioning requirements are: (1) non-skid base, (2) properly secured, and (3) horizontal distance from top support to the foot of the ladder should be one-quarter of the working length of the ladder.

Damaged ladders shall be withdrawn from service, tagged "DO NOT USE", and removed from the Site.

4.2.11 Pressure Washing

Pressure washers will be utilized on-site during vehicle/equipment decontamination. Equipment and vehicle decontamination will take place at the designated vehicle decontamination pad. Barriers will be set up in this area to prevent and warn against accidental entry into decontamination areas by on-site personnel. All pressure washing activities will be performed in accordance with manufacturer's suggestions and sound engineering practice.

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5.0 SITE CONTROL PROCEDURES

5.1 SITE ENTRY AND EXIT

A field office directly inside the primary access gate of the Site will serve as a Site access post. At this location, all Contractors, workers and visitors will sign in daily according to requirements for the Site. Personnel entering the Site will be initially briefed on the Site Health and Safety Plan guidelines and task-specific requirements by the SHSO (or his/her designee). The Site access post will utilize appropriate fencing, gates, and signs to restrict direct Site access.

5.2 DAILY STARTUP

The following procedures will be followed prior to daily Site startup:

- The SHSO (or his/her designee) will review on-site work activities, discuss any pertinent off-Site activities, and outline Site conditions with respect to modifications of the work plans and health and safety plan.
- Personnel will be briefed and updated on safety procedures.
- All safety and monitoring equipment will be checked for proper function.
- The SHSO will ensure that first aid equipment is readily available.
- The SHSO will establish air monitoring background concentrations at a location upwind from the active operations area. Deviations in real-time instrument readings during Site activities will trigger a recheck of the upwind background concentrations to verify the source of the readings.

Start-up activities shall be documented as part of the health and safety daily log.

5.3 WORK ZONES

The primary means of maintaining Site control and reducing migration of hazardous materials into uncontaminated areas will be by designating work zones. Work zones serve to limit hazardous area access, contain gross contamination, provide work zone security, and place a buffer zone between the potentially hazardous area and the rest of the Site. The following zones will be established for each task of the project:

- Exclusion Zone
- Contamination Reduction Zone
- Support Zone.

The exclusion zone is defined as the areas within the Site boundaries. Within the exclusion zone, work zones which are considered contaminated, potentially contaminated, or could become contaminated, will be defined. Once these contaminated or potentially contaminated areas are defined, a buffer zone is added to assure the safety of the surrounding Site community. While the

delineation of the work zones using banner guard is necessary prior to initiating Site work, the zones may be increased or decreased during the course of the project as new data are collected and evaluated. Access control to the work zones through rigidly defined entrance/exit points will be required. Work zone entry and exit will be controlled by the Contractor.

The primary contamination reduction zone is located at the exclusion zone entrance/exit point. The work zone contamination reduction zones will be located upwind, when possible, and will be designed to limit contamination from leaving the work zone as a result of the work party activities. Access control to both the work zone and the support zone will be maintained at this point. This area provides a space for the decontamination of personnel, equipment, and samples, as well as an area to assist the work parties (to be used for respirator cartridge exchange, equipment staging, etc.). This contamination reduction zone will be considered potentially contaminated when personnel or equipment proceed from the work zone through the contamination reduction zone. The boundary area between the work zone and contamination reduction zone will be delineated using banner guard and referred to as the "hot line." It is here that a decontamination corridor is set up to ensure the decontamination of all personnel, equipment and samples leaving the exclusion zone. The other boundary, between the contamination reduction zone and the support zone, will be known as the contamination control line. It will serve as the entrance/exit point to the work zone, and provides Site security as well as contamination control.

The support zone will be the area furthest away from the hazardous substances. It is where the command post will be located and where all support activities will occur. Project health and safety equipment will be stored in the support zone and available for use. This zone will be located in a known, non-contaminated area. All support zone boundaries will be clearly marked with hazard tape and traffic cones.

All contractors and subcontractors performing work on-site will satisfy the following requirements consistent with 29 CFR 1910.120 and provide certifications before initiating work on-site within the Exclusion or Contamination Reduction Zones:

- All personnel performing work on-site will have received and passed a physical examination, including certification of ability to wear respiratory protection and respirator fit-test.
- All personnel performing work on-site will have received required training in the occupational safety and health aspects of hazardous waste Site operations.
- All personnel performing work on-site will have received a briefing on all aspects of the site-specific health and safety plan. All on-site briefings are documented in the site-specific health and safety plans.

All personnel entering the Contamination Reduction Zone and the Exclusion Zone through the contamination control line will be dressed in the appropriate level of protection for the specific task. Similarly, all personnel, equipment, and samples exiting to the support zone, with the exception of hauling vehicles which enter and exit via the clean road, will be completely decontaminated prior to crossing the contamination control line.

5.4 SAFETY CONSIDERATIONS

Safety considerations are required by on-site workers for all activities conducted at the Site. Attachment B provides a list of Employee Health and Safety Rules.

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6.0 AIR MONITORING REQUIREMENTS

6.1 REAL-TIME MONITORING

Real-time monitoring for organic vapors will be conducted continuously throughout intrusive field activities. Real-time dust monitoring will be performed continuously during all soil intrusive activities. Any instrument readings above background concentrations will be applied to the established action levels in order to maintain the appropriate level of personal protection for Site workers and to determine the need for implementation of emissions control procedures. If appropriate, based on the accumulating air monitoring database, the frequency of real-time monitoring may be reduced to be performed at the beginning of new, or re-started, non-intrusive activities.

An aerosol monitor will be used to monitor dust concentrations. The aerosol monitor will be used to monitor the breathing zone of Site personnel while conducting contaminated media disturbance activities. A Photoionization Detector (PID) will be used on-site to monitor site worker breathing zone organic vapor concentrations in work areas during contaminated media disturbance activities. During heavy equipment work activities within buildings or deep excavations, a carbon monoxide monitor will be used to insure carbon monoxide concentrations remain acceptable within the breathing zone of Site workers. Compound specific detector tubes may be used to monitor specific chemicals of concern as identified through visual identification of containers. The need for the use of compound specific detector tubes will be determined by the SHSO based on real-time air monitoring results and compounds believed to be present.

The SHSO will first establish air monitoring background concentrations at a location upwind from the active operations area. Deviations in real-time instrument readings during Site activities will trigger a recheck of the upwind background concentrations to verify the source of the readings. This will include quantifying concentrations upwind and downwind to determine if remediation activities may be a contributor. If downwind air monitoring results indicate Site activities may be a contributor, the work will temporarily stop and Site conditions will be evaluated. The SHSO will contact the perimeter air monitoring technician. The technician will closely monitor the Site's perimeter air monitoring instrumentation to ensure that emissions are not leaving the property. If emissions are detected at the perimeter of the property, engineering controls will be implemented. The use of the PID and aerosol monitor will be to continually conduct worker breathing zone air monitoring, while the carbon monoxide monitor will be used for this purpose during remediation activities using heavy equipment within buildings or deep excavations. Real-time breathing zone readings will be documented in the field log book.

The PID and carbon monoxide monitor will be calibrated and maintained daily, prior to initiating on-site work activities, in accordance with the Standard Operating Procedures. No field calibration will be conducted for the aerosol monitor.

6.2 INDUSTRIAL HYGIENE AIR MONITORING

At the discretion of the SHSO during remediation activities, industrial hygiene air monitoring will be conducted in the breathing zone of selected field personnel to verify the prescribed levels of protection. The personnel to be monitored and the frequency of the sampling event will be determined at the discretion of the SHSO. Organic vapors and contaminated particulate matter present the greatest concern and will either be captured through passive vapor badges or adsorbent

tubes/filter cassettes. The decision making criteria for the frequency of sampling and personnel to be sampled will be based on the task being performed, especially for those on-site workers who are performing tasks closest to expected or suspected source of contaminations. The air samples will be analyzed by an American Industrial Hygiene Association (AIHA) accredited laboratory. Results will be promptly communicated to the PHSO.

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7.0 PERSONAL PROTECTION REQUIREMENTS

7.1 LEVELS OF PROTECTION

Activities will be initiated in Level D protection as presented below. Real-time air monitoring instrument readings obtained during initial remediation activities will be compared to the action levels presented in Section 7.2 to confirm the initial level of PPE provides sufficient respiratory and dermal protection. In general, the personal protective equipment associated with each level of protection is presented below.

Level D	-	Steel toe work boots
	-	Work gloves
	-	Hard hat
	-	Safety glasses with side shields
	-	Long pants, long-sleeve shirt
	-	Hearing protection (during heavy equipment work)
Level D Modified	-	Steel toe work boots with chemical resistant covers
	-	Disposable coveralls (tyvek)
	-	Nitrile outer and inner gloves
	-	Hard hat
	-	Safety glasses with side shields
	-	Long pants, long-sleeve shirt
	-	Hearing protection (during heavy equipment work)
Level C	-	MSA full face air-purifying respirator w/GMC-H cartridges
	-	Steel toe rubber boots with chemical resistant covers
	-	Saranex coveralls or equivalent (taped at the ankles)
	-	Nitrile outer and inner gloves (taped at wrists)
	-	Hard hat
	-	Hearing protection (during heavy equipment work)

Level D protection provides Site workers with dermal protection against incidental contact with particulate matter. Level C provides workers with the appropriate personal protective equipment to safeguard against inhalation, accidental ingestion and/or dermal hazards associated with the Site activities being performed. Levels A and B protection are not anticipated to be required for this project. The use of respiratory protective equipment will be consistent with the requirements of 29 CFR 1910.120 and 134. Modifications in the personal protective equipment requirements outlined in this document may be necessary as new conditions and/or tasks warrant. Addenda and revisions to this health and safety plan will be made only by the Site Health and Safety Officer or the Project Health and Safety Officer, and shall be documented using the Addendum/Revision Form found in Attachment A.

The levels of protection which are required for conducting on-site activities associated with the completion of the scope of work (as described in Section 3.0), are presented in Table 7-1.

The need to upgrade or downgrade the level of protection will be determined by the Site Health and Safety Officer after consulting with the Project Health and Safety Officer.

TABLE 7-1
INITIAL LEVEL(S) OF PROTECTION

Task	Protection	Respiratory	Clothing	Gloves	Boots	Other
General Site Work	D	NA	C	W	ST	HH/SG
Clearing and Grubbing (non-contaminated)	D	NA	C	W	ST	HH/SG/HP
Clearing and Grubbing (contaminated)	D	NA	T	I/N	F	HH/SG/HP
Staging Areas (non-contaminated)	D	NA	C	W	ST	HH/SG
Vehicle Decontamination Pad (non-contaminated)	D	NA	C	W	ST	HH/SG/FS
Vehicle Decontamination Pad (contaminated)	D	NA	T	I/N	F	HH/SG/FS
Fence Inspection/Repair (non-contaminated)	D	NA	C	W	ST	HH/SG
Fence Inspection/Repair (contaminated)	D	NA	T	I	F	HH/SG
Clean Road (non-contaminated)	D	NA	C	W	ST	HH/SG
Clean Road (contaminated)	D	NA	T	I/N	F	HH/SG
Surveying (non-contaminated)	D	NA	C	W	ST	HH/SG
Surveying (contaminated)	D	NA	C	I	F	HH/SG
Excavations	D	NA	T	I/N	F	HH/HP/SG
Waste Removal	D	NA	T	I/N	F	HH/HP/SG
Site Restoration	D	NA	C	W	ST	HH/SG
Soil and Waste Sampling	D	NA	T	I/N	F	HH/SG

Respiratory

APR = Full face air-purifying respirator w/GMC-H cartridges
NA = Not Anticipated

Gloves

I = N-Dex Nitrile
N = Nitrile
W = Work gloves

Boots

F = Steel-toe w/ rubber boot cover
ST = Steel-toe work boot

Clothing

C = Cotton Coveralls
T = Hooded Saranex or Equivalent
S = Saranex or Equivalent

Other

HH = Hard Hat
HP = Hearing Protection
SG = Safety Glasses
FS = Face Shield

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7.2 ACTION LEVELS

In general, the initial level of protection will be maintained until real-time air monitoring data can be collected and applied to the established action levels. For the duration of the task, the actual airborne contaminant concentrations present shall determine the level of protection required.

The following real-time, breathing-zone air concentration action levels provide mandatory guidelines for determining the level of protection appropriate for each task:

Organic Vapors

Organic vapors will be monitored in the breathing zone of on-site workers during intrusive activities where vapors may be generated, and during sampling activities where the potential for residual contamination exists. Readings will be applied to the following action levels.

Level D - background levels
Level C - 1-5 ppm above background;
Level B - > 5 ppm, stop work, and evaluate Site conditions.

Aerosols

An aerosol monitor will be used to collect real-time aerosol concentrations during soil intrusive activities. These concentrations must be applied to the established action levels as follows:

Level D - $< 5.0\ mg/m^3$
Level C - $> 5.0\ mg/m^3$
$> 5.0\ mg/m^3$ - initiate dust suppression methods until acceptable levels are achieved.

Carbon Monoxide

Carbon monoxide monitoring will be performed while using heavy equipment during indoor remediation activities. If carbon monoxide concentrations accumulate in the work area, mechanical ventilation will be used to dissipate the vapors.

< 25 ppm	Continue to work
>25 - 50 ppm	Continue to work, ventilate area
> 50 ppm	Stop work, leave area.

8.0 DECONTAMINATION AND DISPOSAL PROCEDURES

Decontamination procedures are established for the purpose of removing gross contamination that may have accumulated on workers during Site activities, and also to prevent contaminants from migrating from the Site.

8.1 PERSONNEL DECONTAMINATION

All personnel working within the exclusion zone or work area will be required to pass through the contamination reduction zone upon exiting the area. This zone will be set up at the perimeter of the work area and will consist of the following sequential wash and rinse procedure:

- Equipment drop
- Boot wash/rinse
- Outerglove wash/rinse
- Outerglove removal
- Coverall removal
- Respirator removal (if necessary)
- Inner glove removal

During this procedure, methods for properly removing any disposable or contaminated reusable personal protective clothing or equipment must be followed to reduce the possibility of contacting potentially contaminated media.

8.2 EQUIPMENT DECONTAMINATION

8.2.1 Sampling and Monitoring Equipment

Measures shall be taken by personnel to prevent the contamination of any monitoring equipment used on the Site. Once contaminated, instruments are difficult to clean without damaging them. Any delicate instrument, such as monitoring equipment, that cannot be decontaminated easily, should be protected while it is being used by placing it in a bag and using tape to secure the bag around the instrument. Openings in the bag can be made for sample intake and exhaust.

8.2.2 Respiratory Protective Equipment

When respiratory protective equipment is required, there is a high potential for these units to become contaminated. At the end of each work day, all respirators will be thoroughly decontaminated. When decontaminating, this equipment will be properly disassembled (according to manufacturer specifications), washed in soap and water, rinsed, and allowed to dry before reassembly. Disassembly and reassembly shall only be performed by personnel trained in this task.

8.2.3 Heavy Equipment

Potentially contaminated equipment will be decontaminated at the designated vehicle decontamination area using high-pressure water wash prior to the equipment leaving the Site. At a minimum, Modified Level D personal protection will be required for equipment decontamination activities. The decontaminated runoff will be collected and containerized until the waste is characterized and the proper disposal method is determined.

8.3 DISPOSAL OF REMEDIATION-DERIVED WASTES

Remediation-derived wastes will be containerized on-site and labelled as to their contents in accordance with the procedures specified in the Soil and Waste Management Plan. These containers will be staged at the Site to await characterization and disposal in accordance with applicable procedures.

9.0 SITE EMERGENCIES

9.1 GENERAL

The plan has been developed to respond to incidents that occur on the Site and/or due to field activities. It does not address incidents and emergencies created by parties other than the Site contractors.

It is imperative that all personnel, contractors, and subcontractors, know and understand the site-specific emergency procedures in place. These procedures will depend on the type of incident and the exact location of work. Accordingly, this Emergency Contingency Plan is designed to make optimum use of all available resources, so that the threat to people, the environment, and Site property is minimized.

9.2 FIRST AID AND EMERGENCY EQUIPMENT

During activities at the Pulverizing Services Site, a variety of first aid and emergency equipment will be maintained in the support zone by each contractor. All on-site personnel will have access to this equipment in the event of an injury or an exposure to hazardous materials occurs. The various types of first aid and emergency equipment that will be available include:

First Aid Kit
Sterile 15-Minute Eye Wash
Fire Extinguishers

9.3 PERSONAL INJURY

First Aid will be administered to injured personnel, as required, by persons certified for same. Individuals requiring transport to the local hospital, Memorial Health Alliance, will be given emergency first aid on-site, if necessary, and will be transported to the Medical Center by an ambulance/rescue squad. When possible, injured personnel will be decontaminated prior to transport to the Medical Center. In life threatening situations, however, the injured personnel will be wrapped in a sheet or similar barrier material and the Contractor will notify the Memorial Health Alliance emergency staff personnel to prepare them for handling contaminated personnel from the Site. The SHSO will complete the required Exposure/Injury Incident Report for all incidents/injuries occurring on-site during work related activities (See Attachment C).

9.4 GENERAL FIRST AID PROCEDURES

General first aid procedures are included in this section. Typical responses may include:

Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. An eyewash system will be provided on-site at the support zone as appropriate. Eyes should be rinsed for 15 minutes when chemical contamination has occurred.

Inhalation: Move the victim to fresh air immediately. If necessary, restore breathing. Decontaminate and transport to medical facility, if required.

Ingestion: Decontaminate and transport the victim to emergency medical facility immediately.

9.5 BLOOD-BORNE PATHOGENS

The OSHA blood-borne pathogens standard (29 CFR 1910.1030) and ICF Kaiser procedure S&H-205, Bloodborne Pathogens (Attachment E), are designed to protect workers from exposure to the hepatitis B virus (HBV), the human immunodeficiency virus (HIV), and other blood-borne pathogens. These viruses, as well as other organisms that cause blood-borne diseases, are found in human blood and certain other human body fluids. In the event first aid/CPR is required, the contractor shall provide means (i.e. latex gloves and a rescue breathing mouthpiece to be used when first aid/CPR is given) for protecting employees from contact with blood or other potentially infectious materials.

9.6 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SHSO will determine if work can continue without jeopardizing the health and safety of any field workers. Items to be considered prior to determining if work should continue include:

- Potential for heat stress and heat-related injuries,
- Limited visibility,
- Electrical storms,
- Potential for high winds resulting in contaminant transport.

9.7 EMERGENCY INFORMATION

Emergency telephone numbers for the surrounding area and the nearest equipped hospital have been identified and are listed below. Figure 9-1 identifies the route to Memorial Health Alliance, located at 175 Madison Avenue in Mount Holly, NJ. Emergency telephone numbers will be posted in the support zone of the Site.

EMERGENCY CONTACTS

A	Ambulance Service	911
B	Police Non-Emergency	911 609-235-0130
C	Fire Non-Emergency	911 609-234-1222
D	Memorial Health Alliance	609-267-0700
E	Chemical-Oil Spills Cleanup (National Response Center)	800-424-8802

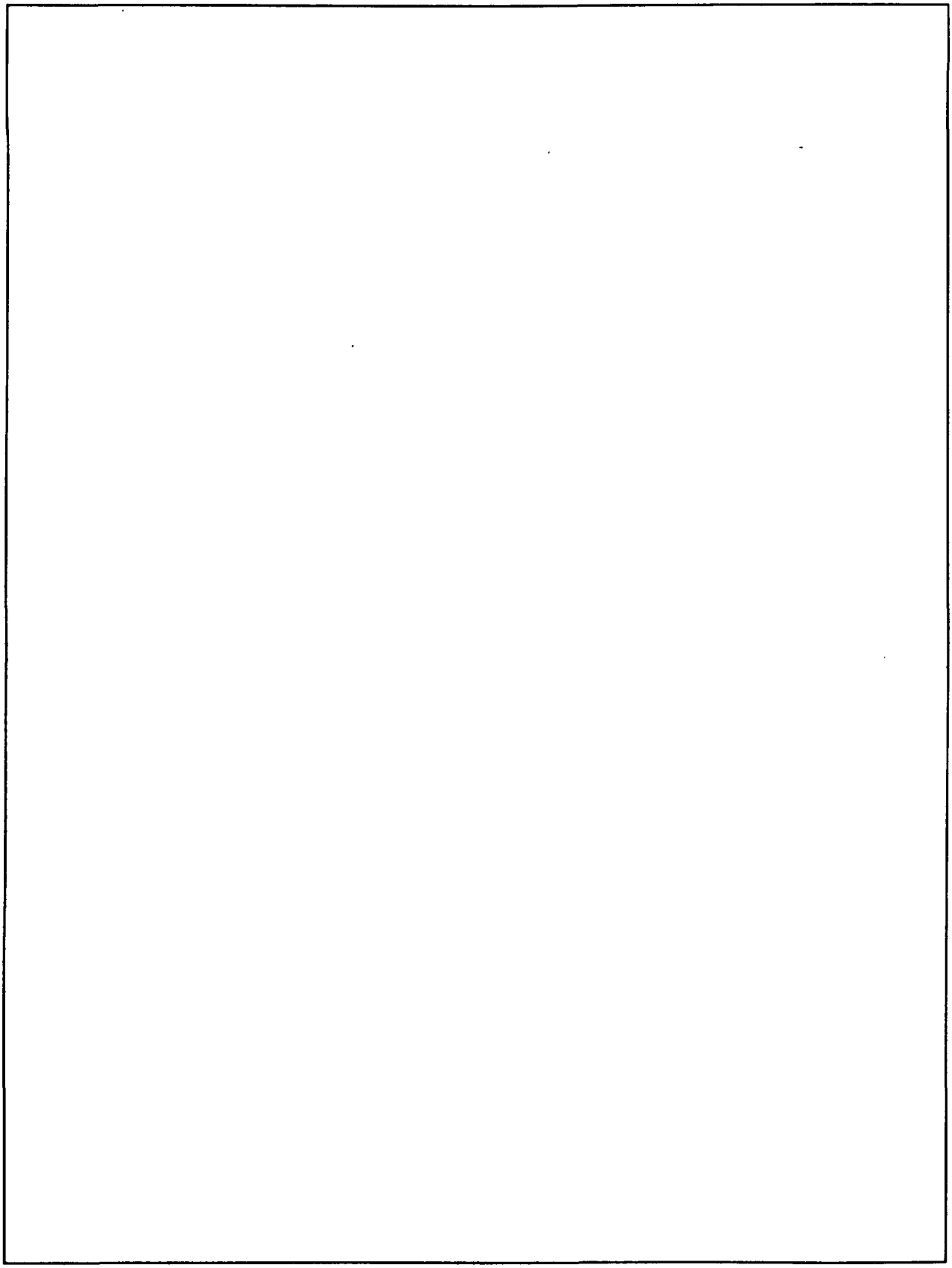


Figure 9-1 Route to Memorial Health Alliance

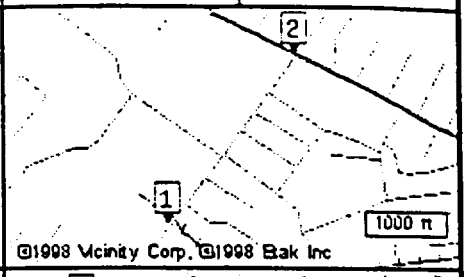
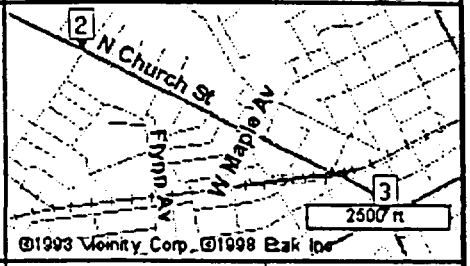
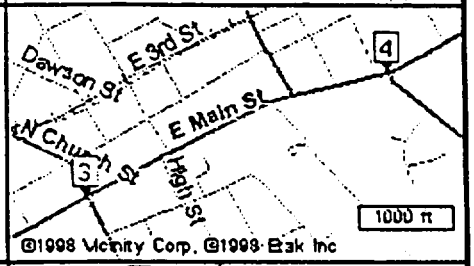
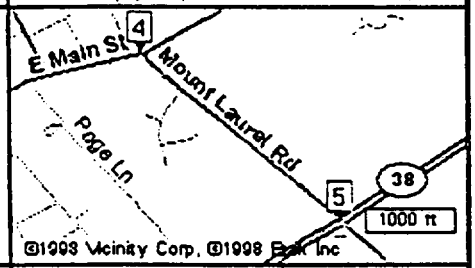
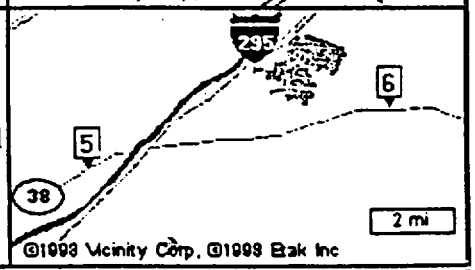
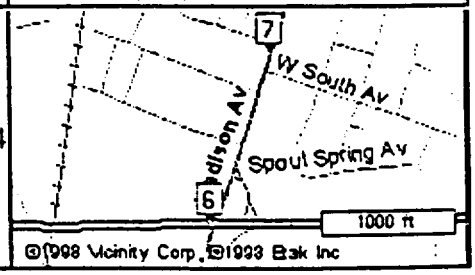
	Directions	miles	Steps
1	Starting at **332 New Albany Rd**, begin on **NEW ALBANY RD** heading northeast for 0.5 miles	0.5	
2	Turn right on **N CHURCH ST** heading southeast for 1.1 miles	1.6	
3	Turn left on **W MAIN ST (537)** heading east for 0.7 miles	2.3	
4	Bear right on **MOUNT LAUREL RD** heading southeast for 0.5 miles	2.8	
5	Turn left on **HWY 38** heading east for 7.3 miles	10.1	
6	Turn left on **MADISON AV (541)** heading northeast for 0.3 miles to **Memorial Health Alliance Corporation**	10.4	

FIGURE 9-1

PULVERIZING SERVICES SITE MOORESTOWN, NEW JERSEY	HOSPITAL ROUTE
ICF KAISER	DATE: 2/2/98 DR.: BRENT SCALE: AS NOTED E/F NO.: 90151002

200456

F	Chemtrec	800-424-9300 (24 Hr.)
G	Centers for Disease Control	770-639-2888 (24 hr)
H	Regional Response Center	212-264-2525 (24 hr)
I	AT&F (Explosives Information)	800-424-9555
J	Poison Control Center	800-764-7661
K	New Jersey Department of Environmental Protection (NJDEP)	609-777-3373

PROJECT EMERGENCY CONTACTS

Health and Safety Director - Jerry Joy	412-497-2056
Project Health and Safety Officer - Daniel J. Welshons	412-497-2329
Project Manager - A. Douglas Weeks, Jr.	412-497-2265
PPG Project Coordinator - Patrick J. Kelly	412-492-5450

10.0 TRAINING REQUIREMENTS

10.1 BASIC TRAINING

Consistent with 29 CFR 1910.120, OSHA Hazardous Waste Operations, personnel performing field work at the Site must have received formal off-site hazardous waste training (with three days on-the-job training) prior to on-site work. This consists of 40 hours of initial training and 8 hours of annual refresher training for field staff. Managers and supervisors must receive an additional 8 hours of specialized off-site training geared toward their supervisory responsibilities.

10.2 PRE-WORK BRIEFING

Prior to the performance of any on-site activities, the Site Health and Safety Officer will review the contents of this document with all personnel who will be performing work on-site. Following the briefing, all personnel will be required to signify that they have read and understood the contents of the plan by signing the Health and Safety Plan Signature Record (see Attachment D).

10.3 DAILY BRIEFINGS

At the beginning of each day, the SHSO (or his/her designee) will review on-site work activities, discuss other unassociated ongoing on-site activities, and outline Site conditions with respect to modifications of work plans and health and safety plans. Personnel will also be briefed and updated on safety procedures.

10.4 OTHER TRAINING

Personnel with CPR and first aid training are required on-site during the Site activities.

11.0 MEDICAL MONITORING REQUIREMENTS

Personnel involved in activities at the Pulverizing Services Site are required to participate in a medical monitoring program consistent with OSHA 29 CFR 1910.120, Hazardous Waste Operations.

11.1 ROUTINE EXAMINATION

All on-site personnel will have medical examinations prior to participation in on-site operations, at the conclusion of the work and/or at 12-month intervals during the project. The exams shall consist of a protocol similar to the following:

- Medical history
- General physical examination (including evaluation of all major organ systems)
- Pulmonary function testing ($FEV_{1.0}$ and FVC)
- Electrocardiogram
- Blood chemistry profile
- CBC
- Standard laboratory urinalysis with microscopic examination
- Audiometric testing
- Chest X-ray
- Visual acuity

11.2 NON-ROUTINE MEDICAL EXAMINATION

Nonscheduled medical examinations shall be conducted under the following circumstances:

- After known or suspected acute exposure to any toxic or hazardous material.
- At the discretion of the Client, Project Manager, Site Health and Safety Officer, the Health and Safety Director, or when an employee is suspected of having been exposed to a significant level of toxic or hazardous material.
- At the discretion of the Client, Project Manager, Site Health and Safety Officer, or Health and Safety Director, and upon receipt of a request for a medical examination from an employee with demonstrated symptoms of exposure to hazardous substances.
- Prior to an employee returning to work after a lost-time injury or illness.

11.3 MEDICAL RECORDS

Medical records for personnel are maintained by their respective employer. Medical records will not be maintained on-site.

12.0 REPORTING

12.1 HEALTH AND SAFETY LOG BOOK

The Site Health and Safety Officer will keep a Site Health and Safety Log Book to record Site information, the names of personnel working on-site, and the names of visitors to the Site. At a minimum, the following information should be recorded in the log book on a daily basis:

- weather
- personnel on-site, company and title
- proposed work activity
- level(s) of protection worn
- air monitoring equipment readings obtained during work activities
- any health and safety-related issues or situations
- daily start-up findings

12.2 EMPLOYEE EXPOSURE/INJURY INCIDENT REPORTING

All incidents resulting in an exposure or injury to personnel on-site (employee or otherwise) are to be recorded on the Employee Exposure/Injury Incident Report Form. This form is to be completed by the Site Health and Safety Officer and submitted to the Project Health and Safety Officer, and the PPG Project Coordinator within 24 hours of the incident.

200461

ATTACHMENT A

HEALTH AND SAFETY PLAN ADDENDUM/REVISION

200462

ATTACHMENT A

HEALTH AND SAFETY PLAN ADDENDUM/REVISION

Section _____

Addendum _____

SITE DESIGNATION/LOCATION

Revision _____

Effective Date _____

Pulverizing Services Site

Approved By:

Project Health and Safety Officer

_____

Date _____

SUBJECT:

Concurrence:

Project Manager

_____

Date _____

Sheet _____ of _____

200463

ATTACHMENT B

EMPLOYEE HEALTH AND SAFETY RULES

200464

ATTACHMENT B

EMPLOYEE HEALTH AND SAFETY RULES

- At least one copy of this plan shall be available at each job work site.
- Horseplay, practical joking, or any other actions that jeopardize safety will not be tolerated.
- Running is not permitted.
- Alcoholic beverages and non-medicinal drugs are not permitted at the project site. Employees suspected of being under the influence of alcohol or drugs may be terminated.
- Radios (excepting two-way radios), tape players or other forms of entertainment devices are prohibited in the authorized zone.
- All activities will be performed in such a manner to minimize or prevent the disbursement or release of contaminants.
- Contaminated protective equipment, such as respirators, hoses, boots, etc., shall not be removed from the regulated area until it has been cleaned, or properly packaged and labeled.
- Legible and understandable precautionary labels shall be affixed prominently to containers of contaminated scrap, waste, debris, and clothing.
- Removal of contaminated soil from protective clothing or equipment by blowing, shaking or any other means which disperse contaminants into the air is prohibited.
- No food or beverages shall be present or consumed in the regulated area. No tobacco products shall be present or used and cosmetics shall not be applied in the regulated area.
- Transportation and disposal of contaminated materials shall comply with all applicable local, state, and federal regulations. These items will be addressed by the transporter and disposer.
- Contaminated materials shall be stored in tightly closed containers in well-ventilated areas.
- Containers shall be moved only with the proper equipment and shall be secured to prevent dropping or loss of control during transport.
- Emergency equipment shall be located outside the storage areas in readily accessible locations which will remain minimally contaminated with materials in an emergency.
- All trenching, shoring, and excavation work must comply with all federal OSHA rules.
- During the operation, all employees shall be required to wash their hands and face before eating, drinking, smoking, or applying cosmetics.
- Portable or fixed emergency shower/eyewash stations shall be located in the regulated area near work activities.

ATTACHMENT B
(Continued)

- All personnel shall be required to field wash, as a minimum, at the end of their shift before leaving the job site if they are contaminated. Hands and face shall be washed during breaks. Wash water from wash facilities is assumed to be contaminated and will be collected for treatment and/or disposal.

- All personnel shall avoid contact with potentially contaminated substances. Walking through the lagoons, puddles or mud, kneeling on the ground, or leaning against drums should be avoided whenever possible.

- Monitoring equipment shall not be placed on potentially contaminated surfaces.

- Field personnel must observe each other for signs of toxic exposure. Indications of adverse effects include, but are not limited to:

    - changes in complexion and skin discoloration
    - changes in coordination
    - changed in demeanor
    - excessive salivation and pupillary response
    - changes in speech pattern

- Field personnel shall be cautioned to inform each other of non-visual effects of toxic exposure such as:

    - headaches
    - dizziness
    - nausea
    - blurred vision
    - cramps
    - irritation of eyes, skin, or respiratory tract

- Prompt removal action shall be taken whenever an inadvertent release of a hazardous material occurs.

- Appropriate action to provide secure footing shall be taken at all locations where personnel will be working.

- Portable sanitary facilities will be provided, and the leasing agent will provide periodic water and solids removal services.

- Provision must be made for cleaning gross contamination from boots and suits in the Contamination Reduction Zone.

- Whenever solvents, cleaners, or other chemical substances are used for decontamination, a properly completed Material Safety Data Sheet for the chemicals shall be available at the work site.

ATTACHMENT B
(Continued)

- Whenever flammable or combustible solvents are used for decontamination, specific procedures for the control of flammable gases and vapors may be necessary. When concentrations of flammable vapors cannot be controlled by ventilation, this would include, but is not limited to, the following:

- Tests shall be made by a qualified person to ensure that concentrations of flammable vapors in the work area do not exceed 20% of the lower explosive limit.

- As appropriate, equipment on-site shall be bonded and grounded, spark proof, and explosion resistant.

- An adequate supply of fire extinguishes with a minimum rating of 10 B:C, shall be strategically located throughout the work area so as to limit the travel distance required by any worker to reach the extinguisher to less than 75 linear feet.

- The Site Health and Safety Officer supported by the Site supervisor shall take positive steps to ensure that employees are protected from physical hazards which would include, but are not limited to, the following:"

-- Discharge of steam, high pressure air, water or oil;
-- Tools or other objects dropping from overhead;
-- Falls from scaffolds, stairs, or ladders;
-- Tripping over hoses, pipes, tools or equipment;
-- Slipping on wet, oily surfaces;
-- Insufficient or faulty personal protective equipment;
-- Insufficient or faulty operations equipment and tools; and
-- Noise in excess of acceptable levels.

ATTACHMENT C

EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT

200468

ICF KAISER ENGINEERS

CONFIDENTIAL

H&S FILE # _____

SUPERVISOR'S INJURY/INCIDENT REPORT

This is an official document to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the Corporate Health and Safety office within 24 hours of the injury or incident.

Injured's Name _____ Sex _____ S.S. No. _____ Birthdate _____

Home Address _____ City _____ State _____ Zip _____ Phone _____

Job Title _____ Employee's B.U. _____ Hire Date _____ Hourly Wage _____

SUPERVISOR

Date of incident _____ Time _____ Time reported _____ To Whom? _____

Client name _____ Client address _____ Time shift began _____

Exact location of incident _____ Did employee leave work? ___ No ___ Yes When _____

Has employee returned to work? ____ No ____ Yes When _____

Did employee miss a regularly scheduled shift after the day of the incident? ____ No ____ Yes

Nature of injury _____ Exact body part _____

Medical Attention: _____ None _____ First aid on site _____ Doctor's office _____ Hospital ER _____ Hospitalized

Job assignment at time of incident _____ Project _____ Task _____ Subtask _____

Describe incident _____

What unsafe physical condition or unsafe act caused the incident? _____

What corrective action has been taken to prevent recurrence? _____

Supervisor _____ _____ _____

(Print) Signature Date

MANAGER

Comments on incident and corrective action _____

Manager's name _____ _____ _____

(Print) Signature Date

HEALTH AND SAFETY

Concur with action taken? ___ No ____ Yes Remarks _____

OSHA Classification:

____ Incident only ____ First aid ____ No lost workdays ____ Lost workdays ____ Restricted activity ____ Fatality

Days away from work _____ Days restricted work _____ Total days charged _____

Coding: A. Injury type or illness ___ B. Injured body parts ___ C. Activity at time of accident ___ D. Injury cause code ___

E. Agent code ___ F. Safety rule violated code ___ G. Accident prevention code ___

Name _____ _____ _____

(Print) Signature Date 200469

White: Corporate Health and Safety Yellow: Corporate Insurance Pink: Business Unit Manager

hs79 CC: General Counsel's Office if accident involves death, serious injury or substantial property damage.

ATTACHMENT D

HEALTH AND SAFETY PLAN SIGNATURE FORM

200470

ATTACHMENT D

HEALTH AND SAFETY PLAN SIGNATURE FORM

SITE NAME/NUMBER _____

REGION/LOCATION _____

I have read, understood, and agreed to comply with the provisions of the above-referenced Health and Safety Plan (HASP) for work activities on this Site.

PRINTED NAME	SIGNATURE	DATE

200471

ATTACHMENT E

ICF KAISER HEALTH AND SAFETY PROCEDURES

200472

TITLE: CONFINED SPACE ENTRY

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to perform confined space entry; and to serve as the foundation of the mandatory written permit-required confined space entry program.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Acceptable entry conditions** means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

(b) **Attendant** means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

(c) **Authorized entrant** means an employee who is authorized by the employer to enter a permit space.

(d) **Confined space** means a space that: (1) Is large enough and so configured that an employee can bodily enter and perform assigned work; **and** (2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); **and** (3) Is not designed for continuous employee occupancy.

(e) **Entry** means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

(f) **Entry permit (permit)** means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in Section 8 of this procedure.

(g) **Entry supervisor** means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section. *NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and*

equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

(h) **Hazardous atmosphere** means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL); (2) Airborne combustible dust at a concentration that meets or exceeds its LFL; *NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.* (3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent; (4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910, and which could result in employee exposure in excess of its dose or permissible exposure limit; *NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.* (5) Any other atmospheric condition that is immediately dangerous to life or health. *NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, 29 CFR 1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions*

(i) **Immediately dangerous to life or health (IDLH)** means any condition that poses an immediate or delayed threat to life, or that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a permit space. *NOTE: Some materials -- hydrogen fluoride gas and cadmium vapor, for example -- may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.*

(j) **Inerting** means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible. *NOTE: this procedure produces an IDLH oxygen-deficient atmosphere.*

(k) **Isolation** means the process by which a permit space is removed from service and completely protected against the release of energy and introduction of material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources

of energy (see Procedure No. S&H-103); or blocking or disconnecting all mechanical linkages.

(l) **Non-permit confined** space means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

(m) **Oxygen deficient atmosphere** means an atmosphere containing less than 19.5 percent oxygen by volume.

(n) **Oxygen enriched atmosphere** means an atmosphere containing more than 23.5 percent oxygen by volume.

(o) **Permit-required confined space (permit space)** means a confined space that has one or more of the following characteristics: (1) contains or has a potential to contain a hazardous atmosphere; or (2) contains a material that has the potential for engulfing an entrant; or (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or (4) contains any other recognized serious safety or health hazard.

(p) **Prohibited condition** means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

(q) **Rescue service** means the personnel designated to rescue employees from permit spaces.

(r) **Retrieval system** means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

(s) **Testing** means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. *NOTE: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.*

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) The project manager shall have a competent person evaluate the workplace to determine if any spaces are permit-required confined spaces. *NOTE: Proper application of the decision flow chart in Attachment A would facilitate compliance with this requirement.*

(b) If the workplace contains permit spaces, the project manager shall inform exposed employees (and subcontractors if applicable), by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces. *NOTE: A sign reading DANGER – PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.*

(c) If permit spaces exist in the workplace, and employees will not be permitted to enter permit spaces, the project manager shall take effective measures to prevent employee entry into permit spaces.

(d) If non-permit spaces are modified, or experience any change that causes an increased hazard to entrants, the project manager shall reevaluate that space and if necessary reclassify it as a permit-required confined space.

(e) If any subcontract employee is to enter a permit space, prior to the initial entry, the project manager shall: (1) inform the subcontract employer that the workplace contains permit spaces, and that entry must comply with 29 CFR 1910.146; (2) inform the subcontract employer of the elements, including known hazards and experiences from any previous entries into the space, that classify the space as a permit space; (3) inform the subcontract employer of any controls or procedures implemented to protect employees near the subcontractor's work area; (4) coordinate entry operations among client, contractor and subcontractor personnel when necessary; and (5) debrief the subcontract employer at the conclusion of entry operations regarding the permit space entry program and any hazards or problems encountered during the entry operations.

6. IMPLEMENTATION

(a) **Non-Permit Confined Spaces.** Entry into non-permit confined spaces will be subject to the following controls:

- The project manager (or designee) and project safety officer shall be informed in advance of the planned entry.
- The entry shall be coordinated with any work activities near the non-permit space so that hazardous conditions will not be created in or around the space.
- The buddy system will be used for all entries.

- Entrants will immediately withdraw upon recognition of any hazardous condition.
- The project manager and project safety officer will be advised of any unanticipated incidents related to the non-permit space entry.

(b) **Permit-Required Confined Spaces**

Entry into permit-required confined spaces will be subject to the following controls:

(1) Unauthorized entries shall be prohibited, and measures will be implemented to prevent such entries.

The project manager shall develop additional written program controls which will specifically address the permit spaces and entries unique to the individual project scope of work and conditions.

(2) Hazards shall be identified and evaluated prior to entry. Hazards to be addressed include:

- Chemical exposure (via inhalation, ingestion, or dermal absorption) from the contents or residues of previous contents of the space, from chemicals introduced into the space as part of the entry operation, and from chemicals used near the space;
- Oxygen deficiency or enrichment;
- Discharge of steam, high-pressure air, water or oil into the confined space, or against personnel working outside.
- Structural failure of the space walls, roof, roof support members, swing line cables or other structural members.
- Tools, debris, or other objects dropping from overhead.
- Falls through or from the roof, or from scaffolds, stairs or ladders.
- Tripping over hoses, pipes, tools, or equipment.
- Slipping on wet, oily surfaces or colliding with objects in inadequately lighted interiors.
- Insufficient or faulty personal protective equipment.
- Insufficient or faulty operations equipment and tools.
- Noise in excess of acceptable levels.
- Temperature extremes which may require additional protection or shorter work periods.

(3) The project manager shall, as part of the written material under 6.b.1 above, develop procedures and practices to ensure safe conduct of entry operations. The following points at least shall be fully addressed:

- acceptable entry conditions shall be specified (both chemical and physical conditions shall be addressed, and conditions which could arise as a result of operations performed outside the space shall be considered).

- procedures to fully isolate the space (this may not be feasible in sewers, see Attachment C).

(4) Isolation of a space shall include the following steps as applicable:

- Depressurize the confined space.
- Prevent accidental introduction into the confined space of hazardous materials through interconnecting equipment such as piping, ducts, vents, drains, or other means.
- De-energize, lockout, and tagout machinery, mixers, agitators, or other equipment containing moving parts that are in the confined space.
- Removing a valve, spool piece, or expansion joint in piping to, and as close as possible to, the confined space, and blanking or capping the open end of the pipe leading to the confined space.
- Inserting a suitable full-pressure blank in piping between the flanges nearest to the confined space.
- Closing, locking, and tagging at least two valves in the piping leading to the confined space, and locking or tagging open to atmosphere a drain valve between the two closed valves, which shall be checked to ensure that it is not plugged.
  - In all cases, blanks or caps shall be of a material that is compatible with the liquid, vapor, or gas with which they are in contact.
  - The material shall also have sufficient strength to withstand the maximum operating pressure, including surges, which can be built up in the piping.

(5) In addition, all electrical and mechanical devices within or attached to the confined space shall be disconnected, or locked, and tagged to prevent accidental movement or energizing of such systems.

(6) All employees who will be working in the confined space shall be informed of the isolation devices in use at the jobsite during safety meetings.

(7) Purge, inert, flush, or ventilate the space as necessary to eliminate or control atmospheric hazards.

(8) Provide barriers to protect entrants from external hazards.

(9) Verify that conditions in the permit space are acceptable throughout the duration of the entry.

(10) The following equipment shall be provided, maintained and utilized whenever necessary for safe entry operations:

- Testing and monitoring equipment needed to perform specified atmospheric testing.
- Ventilating equipment needed to create and maintain acceptable entry conditions. Ventilation of permit spaces shall be performed as follows:
  - Prior to ventilating a confined space, a qualified person shall take positive steps to ensure that no pyrophoric materials that will ignite in the presence of air are present in the confined space.
  - All confined spaces shall be mechanically ventilated to remove and/or prevent the accumulation of hazardous atmospheres.
  - Air or steam driven air movers shall be used to ventilate confined spaces. Use of electric powered ventilators is strictly limited to spaces that have not contained flammable or combustible materials.
  - Oxygen shall not be used to power air-driven ventilators or to ventilate any confined space location.
  - The entry supervisor shall check periodically to ensure that contaminated air from a confined space is exhausted to a location where it presents no hazard.
  - Whenever possible, air movers shall be used with ducting to increase the efficiency of ventilation in the confined space and to prevent recirculation of contaminated air due to ventilation "short circuiting".
  - When two or more air movers are used for ventilation, all such units should be operated in the same flow direction to maximize efficiency, i.e., all in the exhaust mode or all in the supply mode.
- Communications equipment necessary to permit immediate, understandable communications between the entrant(s) and the attendant(s).
- Personal protective equipment necessary to supplement feasible engineering and work practice controls.
- Lighting equipment necessary for safe operations and emergency exit. Temporary lighting used in confined spaces shall meet the following requirements:
  - All lighting shall be approved for use in Class I, Division I, Groups A, B, C, and D atmospheres.
  - Extension cords used for temporary lighting shall be equipped with connectors or switches approved for hazardous locations.
  - Temporary lighting shall be equipped with adequate guards to prevent accidental contact with the bulb.
  - The lighting shall not be suspended by the electric cords, unless they are designed for this method of suspension.
  - Electric cords shall be kept clear of working spaces and walkways or other locations in which they may be exposed to damage.
  - Temporary lighting and electric cords shall be inspected regularly for signs of damage to insulation and wiring.
- Specified barriers and shields.
- Equipment such as ladders needed for safe ingress and egress.

- Rescue and emergency equipment unless provided by local rescue services.
- Any other equipment necessary for safe entry and rescue from permit spaces.

(11) Prior to authorizing entry, tests shall be conducted by a competent person to determine if acceptable entry conditions exist. When spaces are not fully isolated due to their size or design (sewers), pre-entry testing will be conducted to the extent feasible, and if entry is authorized, conditions shall be continuously monitored in the work area.

During the course of entry operations, test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained; and

When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors. *NOTE: Atmospheric testing conducted in accordance with Attachment B would be considered as satisfying these requirements. For permit space operations in sewers, atmospheric testing conducted in accordance with Attachment B, as supplemented by Attachment C, would be considered as satisfying these requirements.*

(12) At least one attendant shall be stationed outside the permit space for the duration of the entry operations. *NOTE: Attendants may be assigned to monitor more than one permit space provided the duties described in Section 10.b of this procedure can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in Section 10.b of this procedure can be effectively performed for each permit space that is monitored.*

If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under Section 10.b of this procedure.

(13) The roles and duties of each person participating in an entry operation (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) shall be established and each person shall receive training commensurate with the duties assigned.

(14) Procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue shall be developed and implemented.

(15) Procedures to coordinate entry operations among multi-employer workforces shall be developed and implemented.

(16) The permit space shall be secured and entry-related documentation shall be completed and retained in project files for a period of at least one year.

(17) The entry program shall be reviewed and any deficiencies corrected whenever evidence exists that employee protection is inadequate. *NOTE: Examples of circumstances requiring the review of the permit-required confined space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.*

(18) The permit-required confined space program shall be reviewed, using the canceled permits retained under Section 7.f of this procedure, within 1 year after each entry and revised as necessary, to ensure that employees participating in entry operations are protected from permit space hazards. *NOTE: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary.*

(c) **Alternate Entry Procedure**

A simpler, alternate procedure may be followed for permit-required space entry if all of the following conditions are met:

- The only hazard posed by the permit space is from an existing, or potential hazardous atmosphere.
- Continuous forced air ventilation alone is sufficient to maintain the space safe for entry.

(1) Monitoring and inspection data supporting the above two conditions is collected and documented. Entries conducted to obtain this data must be conducted according to Section 6.b above.

(2) Supporting data must be made available to each employee who enters the permit space under this alternate procedure.

(3) The alternate entry procedure shall conform to the following:

- Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
- When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

- Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for the following conditions in the order given: (1) oxygen content, (2) flammable gases and vapors, and (3) potential toxic air contaminants.
- There may be no hazardous atmosphere within the space whenever any employee is inside the space.
- Continuous forced air ventilation shall be used, as follows: (1) an employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere; (2) the forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space; (3) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.
- The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere.
- If a hazardous atmosphere is detected during entry: (1) each employee shall leave the space immediately; (2) the space shall be evaluated to determine how the hazardous atmosphere developed; and (3) measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.
- The employer shall verify that the space is safe for entry and that the measures required by 6.c have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification.
- The certification shall be made before entry and shall be made available to each employee entering the space.

7. ENTRY PERMIT SYSTEM

(a) Before authorization to enter is granted, the completion of hazard control measures specified in 6.b and 6.c above shall be documented on an entry permit (Attachment D).

(b) The entry supervisor shall authorize the entry by signing the completed permit.

(c) The signed permit shall be posted or otherwise made available to all authorized entrants so that they may confirm that all pre-entry preparations are in place.

(d) The duration of the permit may not exceed the time required to complete the assigned purpose of the entry.

(e) The entry supervisor will terminate the entry and cancel the permit when either of the following occur:

- The operations covered by the permit have been completed;
- Any condition not allowed under the entry permit occurs in or near the permit space.

(f) Canceled entry permits shall be retained for at least 1 year so that the program review required under 6.b.18 above may be performed. Any problems which occur during an entry shall be noted on the permit.

8. ENTRY PERMIT

(a) The entry permit shall contain the following information:

- The permit space to be entered;
- The purpose of the entry;
- The date and the authorized duration of the entry permit;
- The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space; NOTE: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.
- The personnel, by name, currently serving as attendants;
- The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;
- The hazards of the permit space to be entered;
- The measures used to isolate the permit space and to eliminate or control permit space hazards before entry; NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.
- The acceptable entry conditions;
- The results of initial and periodic tests performed under section XX of this procedure, accompanied by the names or initials of the testers and by an indication of when the tests were performed;
- The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;
- The communication procedures used by authorized entrants and attendants to maintain contact during the entry;
- Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;
- Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

- Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

9. TRAINING

The project manager shall assure that all employees assigned to tasks under this procedure have been trained, and have the understanding, knowledge, and skills necessary for the safe performance of their duties.

(a) Training shall be provided to each employee on the following occasions:

- Before the employee is first assigned duties under this procedure;
- Before there is a change in assigned duties;
- Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;
- Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by 6(b) and 6(c) of this procedure or that there are inadequacies in the employee's knowledge or use of these procedures.

(b) The training shall establish employee proficiency in the duties required by this procedure and shall introduce new or revised practices, as necessary, for compliance with this procedure.

(c) Training required by this section shall be certified. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

10. ASSIGNMENT OF DUTIES

(a) **Authorized Entrants.** The employer shall ensure that all authorized entrants:

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Properly use equipment as required by section 6.c of this procedure;

(3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by section 10.b.6 of this procedure;

(4) Alert the attendant whenever:

- The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or

- The entrant detects a prohibited condition; and

(5) Exit from the permit space as quickly as possible whenever:

- An order to evacuate is given by the attendant or the entry supervisor,
- The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
- The entrant detects a prohibited condition, or
- An evacuation alarm is activated.

(b) **Attendant.** The employer shall ensure that each attendant:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;

(3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under section 8.a of this procedure accurately identifies who is in the permit space;

(4) Remains outside the permit space during entry operations until relieved by another attendant; NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by Section 11.a of this procedure and if they have been relieved as required by Section 10.b.4 of this procedure.

(5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under Section 10.b.6 of this procedure:

(6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions;

- If the attendant detects a prohibited condition;
- If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
- If the attendant detects a situation outside the space that could endanger the authorized entrants; or
- If the attendant cannot effectively and safely perform all the duties required under section XX of this procedure.

(7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

(8) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

- Warn the unauthorized persons that they must stay away from the permit space;
- Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and
- Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;
  - Performs non-entry rescues as specified by the employer's rescue procedure; and
  - Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(c) **Entry supervisor.** The employer shall ensure that each entry supervisor:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

(3) Terminates the entry and cancels the permit as required by Section 7.e of this procedure;

(4) Verifies that rescue services are available and that the means for summoning them are operable;

(5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

(6) Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

11. RESCUE AND EMERGENCY SERVICES

(a) The following requirements apply to employers who have employees enter permit spaces to perform rescue services.

(1) The employer shall ensure that each member of the rescue service is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces.

(2) Each member of the rescue service shall be trained to perform the assigned rescue duties.

(3) Each member of the rescue service shall also receive the training required of authorized entrants under Section 9 of this procedure.

(4) Each member of the rescue service shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

(5) Each member of the rescue service shall be trained in basic first-aid and in cardiopulmonary resuscitation (CPR). At least one member of the rescue service holding current certification in first aid and in CPR shall be available.

(b) When an employer (host employer) arranges to have persons other than the host employer's employees (outside rescuer) perform permit space rescue, the host employer shall ensure that:

(1) the outside rescuer can effectively respond in a timely manner to a rescue summons.

(2) the outside rescuer is equipped, trained and capable of functioning appropriately to perform permit space rescues at the host employer's facility.

(3) the outside rescuer is aware of the hazards they may confront when called on to perform rescue at the host employer's facility.

(4) the outside rescuer is provided with access to all permit spaces from which rescue may be necessary so that the outside rescuer can develop appropriate rescue plans and practice rescue operations.

(c) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

(1) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head or other point which the employer can establish will ensure that the entrant will present the smallest possible profile during removal.

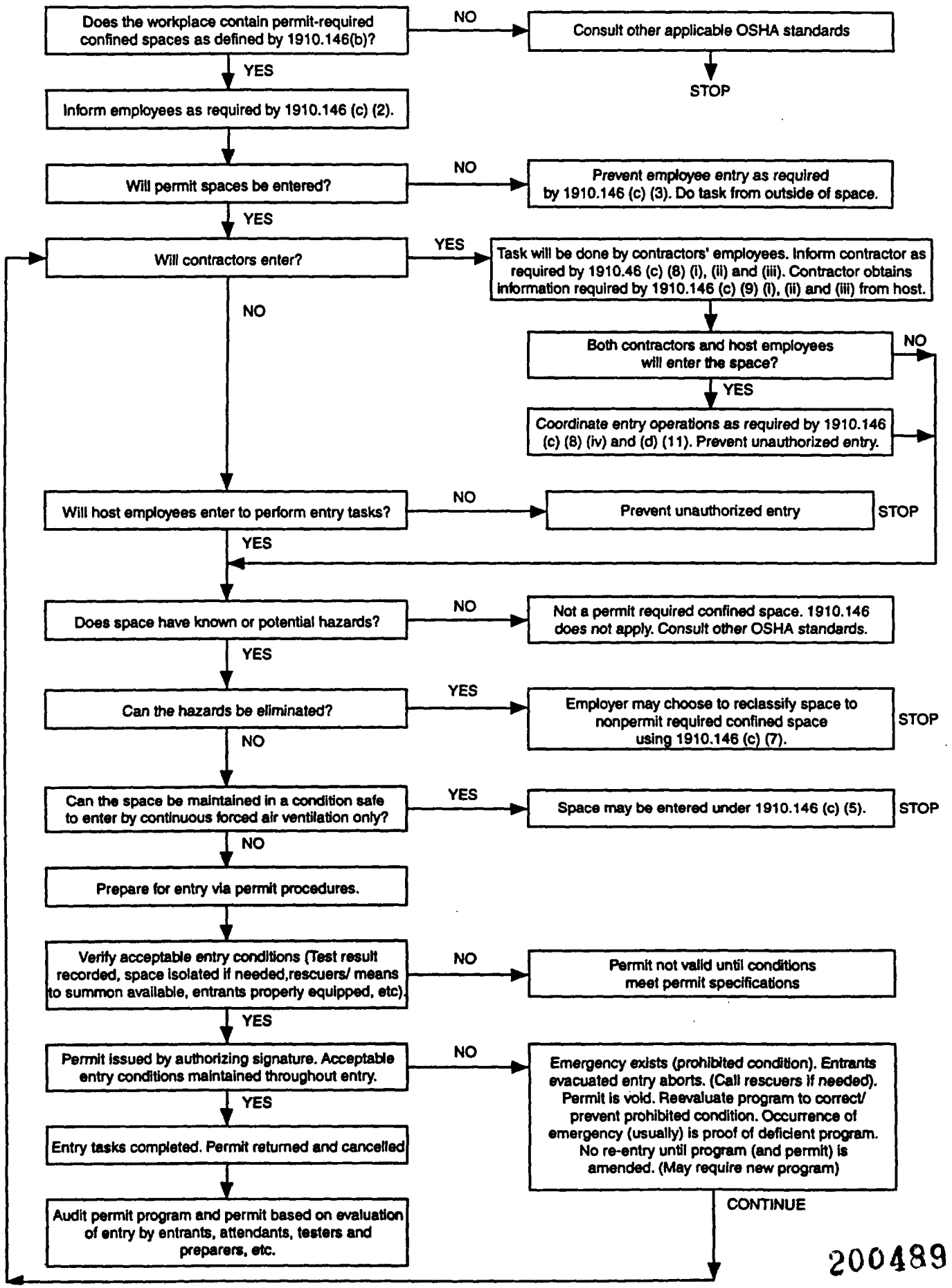
(2) The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

(d) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

12. EXHIBITS/ATTACHMENTS

The Confined Space Entry Permit (Attachment D) is used for documenting activities associated with this procedure. The completed Permits shall be maintained for a period of 1 year from the date of cancellation, in accord with section 7.f above.

PERMIT-REQUIRED CONFINED SPACE DECISION FLOW CHART



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ATTACHMENT B -- PROCEDURES FOR ATMOSPHERIC TESTING.

Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions for entry into that space exist.

B.1. **Evaluation testing.** The atmosphere of a confined space should be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise, so that appropriate permit entry procedures can be developed and acceptable entry conditions stipulated for that space. Evaluation and interpretation of these data, and development of the entry procedure, should be done by, or reviewed by, a technically qualified professional (e.g., certified industrial hygienist, marine chemist registered safety engineer, certified safety professional, etc.) based on evaluation of all serious hazards.

B.2. **Verification testing.** The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by evaluation testing using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions. Results of testing (i.e., actual concentration, etc.) should be recorded on the permit in the space provided adjacent to the stipulated acceptable entry condition.

B.3. **Duration of testing.** Measurement of values for each atmospheric parameter should be made for at least the minimum response time of the test instrument specified by the manufacturer.

B.4. **Testing stratified atmospheres.** When monitoring for entries involving a descent into atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant's rate of progress should be slowed to accommodate the sampling speed and detector response.

ATTACHMENT C -- SEWER SYSTEM ENTRY.

Sewer entry differs in three vital respects from other permit entries; first, there rarely exists any way to completely isolate the space (a section of a continuous system) to be entered; second, because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (toxic, flammable or explosive) from causes beyond the control of the entrant or employer, and third, experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

C.1. **Adherence to procedure**. The employer should designate as entrants only employees who are thoroughly trained in the employer's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

C.2. **Atmospheric monitoring**. Entrants should be trained in the use of, and be equipped with, atmospheric monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions is encountered: oxygen concentration less than 19.5 percent; flammable gas or vapor at 10 percent or more of the lower flammable limit (LFL); or hydrogen sulfide or carbon monoxide at or above their PEL (10 ppm or 50 ppm, respectively); or, if a broad range sensor device is used, at 100 ppm as characterized by its response to toluene. Normally, the oxygen sensor/broad range sensor instrument is best suited for sewer entry. However, substance specific devices should be used whenever actual contaminants have been identified. The instrument should be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrants' direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

C.3. **Surge flow and flooding**. Sewer crews should develop and maintain liaison, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be delayed or interrupted and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

C.4. **Special Equipment**. Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

ATTACHMENT D -- CONFINED SPACE ENTRY PERMIT

*** VALID FOR ONE SHIFT ONLY ***

PROJECT #	CLIENT	DATE	TIME
LOCATION OF SPACE			
PURPOSE OF ENTRY			
PRIOR CONTENTS OF SPACE		TYPE OF SPACE	

PRE ENTRY ATMOSPHERIC TESTING

COMPOUND	ACCEPTABLE RANGE	TIME	YES	NO	N/A
OXYGEN	>19.5% AND <23.5%				
LEL	<10%				
CO	<35 PPM				
H_2S	<10 PPM				
HYDROCARBONS	<1 PPM				
OTHER	< PEL				

HAZARD CONTROLS IMPLEMENTED

ACTION COMPLETED	YES	NO	N/A
SPACE FULLY ISOLATED			
SPACE EMPTIED AND FREE OF RESIDUE			
MECHANICAL VENTILATION OPERATING			
SPACE SECURE FROM ACCIDENTAL ENTRY			
SAFE ACCESS INTO/FROM SPACE AVAILABLE			
EQUIPMENT USED IN SPACE INTRINSICALLY SAFE			
ELECTRICAL GROUNDING AND BONDING IN PLACE			
ALL ENTRANTS, ATTENDANTS, AND SUPERVISORS TRAINED			
RESPIRATORY PROTECTION PROVIDED			
SKIN/BODY PROTECTION PROVIDED			
EYE, EAR, AND HEAD PROTECTION PROVIDED			
EMERGENCY RESCUE SERVICES AVAILABLE			

SIGNATURES

ALL ITEMS ABOVE MUST BE YES OR N/A

ENTRY AUTHORIZED BY: (ENTRY SUPERVISOR)	
ATTENDANT:	ATTENDANT:
ENTRANT:	ENTRANT:
ENTRANT:	ENTRANT:

USE THIS FORM IN ACCORDANCE WITH ICF KAISER PROCEDURE S&H-101

TITLE: EXCAVATION AND TRENCHING SAFETY

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to perform excavation and trenching operations.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Accepted Engineering Requirements**

Those requirements which are compatible with standards of practice required by a registered professional engineer.

(b) **Benching**

A method of protection made by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical, or near-vertical surfaces between steps.

(c) **Cave-In**

The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

(d) **Competent Person**

One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measure to eliminate them.

(e) **Permit Required Confined Space**

An enclosed space that is large enough and so configured that an employee can bodily enter and perform assigned work in it; and has limited or restricted means for entry or exit; and is not designed for continuous employee occupancy; and has one or more of the following characteristics:

- Contains or has a known potential to contain a hazardous atmosphere or
- Contains a material with the potential for engulfment of an entrance or
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section or
- Contains any other recognized serious safety or health hazard.

(f) **Excavation**

Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a trench.

(g) **Faces or Sides**

The vertical or inclined earth surfaces formed as a result of excavation work.

(h) **Hazardous Atmosphere**

An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

(i) **Protective System**

A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

(j) **Shield System**

A structure that is able to withstand the forces imposed on it in a cave-in and thereby protect employees within the structure. Shields used in trenches are usually referred to as trench boxes or trench shields.

(k) **Sloping System**

A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

(l) **Stable Rock**

Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered stable when the rock material on the side or sides is secured against cave-in or movement by rock bolts or by another protective system designed by a registered professional engineer.

(m) **Support System**

A structure such as underpinning, bracing, or shoring which provides support to an adjacent structure, underground installation, or the sides of an excavation.

(n) **Tabulated Data**

Tables and charts approved by a registered professional engineer and used to design and construct a protective system.

(o) **Trench**

A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

Not applicable.

6. IMPLEMENTATION

(a) **Pre-Excavation or Trenching Operation Requirements**

(1) **Preparation for Excavation or Trenching Operations.** The following precautions shall be taken in preparation for excavation or trenching operations:

- All existing utility or other underground facilities shall be located before excavation commences. The utility company or owner shall be contacted within customary or established response times (check state and local laws) to identify underground facilities. If the utility or owner cannot respond, or cannot locate the facilities, excavation may proceed with caution, using a cable-avoiding tool or similar device.
- Surface encumbrances (trees, boulders, poles) whose location may create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.
- When using protective systems requiring soil classification, each soil and rock deposit shall be classified by a competent person as "Stable Rock, Type A, Type B, or Type C." The classification shall be made based on the results of at least one visual and at least one manual analysis. Such analysis shall be conducted by a competent person using acceptable visual and manual tests or other recognized methods of soil classification. The manual test shall consist of soil plasticity dry strength, thumb penetration, pocket penetrometer or results from a hand-operated shearvane. The test shall be documented utilizing the Excavation Notification Worksheet (Exhibit D), signed and dated by the competent person.
- The slopes and configurations of sloping and benching systems for excavations 5 to 20 feet in depth shall be selected and constructed by a designated competent person and shall be in accordance with the requirements of the following table:.

Soil or Rock Type	Maximum Allowable Slope (Horizontal:Vertical)	
Stable Rock	Vertical	(90 degrees)
Type A	3/4:1	(53 degrees)
Type B	1:1	(45 degrees)
Type C	1-1/2:1	(34 degrees)

Note: ***No soil classification is required if a 1-1/2:1 (horizontal:vertical) or 34-degree slope is used. If a 1-1/2:1 (horizontal:vertical) 34 degrees slope is not used, a soil classification must be made. The excavation must then comply with one of the three following options.***

- **Option I:** Maximum allowable slopes, and allowable configurations for sloping and benching systems shall be determined in accordance with the conditions and requirements in 1926 Subpart P Appendices A (soil classification) and B (sloping and benching). Refer to the OSHA Construction Industry standards.

- **Option II:** Designs of sloping or benching systems shall be selected by using tabulated data based on soil conditions. These tables are to be calculated and prepared by a Registered Professional Engineer. This

information must be documented, and filed on site with the Registered Professional Engineer's stamp on the tables.

- **Option III:** The sloping and benching system must be designed by a Registered Professional Engineer. This information must be documented and filed on site with the Registered Professional Engineer's stamp on the plan.

(i) Employees shall not be required or permitted to design protective systems unless they are registered professional engineers, or unless the protective system design is approved by a registered professional engineer.

(ii) Systems for sloping and benching of excavations in excess of 20 feet deep must be designed and stamped by a Registered* Professional Engineer.

(iii) Design of support systems, shield system, and other protective systems shall be selected and constructed by a designated competent person and shall be in accordance with one of the four options following:

- **Option I** - Designs Using Appendices A, C, D. Timber shoring in trenching may be determined using conditions and requirements of OSHA Appendices A (soil classification), C (timber shoring for trenches) and D (designs for hydraulic shoring). Refer to 29 CFR 1926.652, the **OSHA Construction Industry standards.**

- **Option II** - Designs Using Manufacturer's Tabulated Data. Designs of support systems, shield systems or other protective systems, may be drawn from manufacturer's tabulated data in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer (i.e. trench jacks, hydraulic shoring). The supporting information must be filed on site.

- **Option III** - Designs Using Other Tabulated Data. Designs of support systems, shield systems, or other protective systems may be selected from and be in accordance with tabulated data. The supporting data must be filed on the site.

- **Option IV** - Designs by a Registered Professional Engineer (Must be registered in the state where the work is being performed). Support systems, shield systems, and other protective systems not utilizing Options I, II, or III, shall be approved and stamped by a Registered Professional Engineer.

* Registered in the state in which the excavation is located.

Exhibits A, B, and C are attached as guidelines for the proper selection of excavation and trenching protection systems.

(2) **Notification.** Prior to any excavation or trenching operations, the following reviews and notification forms must be completed.

(i) Any project involving trenching or excavations that are 5 feet or deeper, into which a person is required to descend, shall be reviewed by the field safety and health staff.

(ii) An Excavation Notification Worksheet (Exhibit D) shall be completed by the project manager and submitted to the safety and health staff in advance of the commencement of work.

(iii) Certain states (e.g., California) require pre-excavation notification and permitting of excavation work. The project manager shall ensure that such state or locally required notifications are completed and any other requirements met: for example, the 5-foot depth mentioned in this section may be more restrictive in certain states.

(3) **Employee Information and Training.** Employee training shall include the following:

(i) A safety meeting shall be conducted by the site supervisor at the beginning of each job in accordance with Procedure No. S&H-006. The meeting shall detail the specific hazards anticipated, and the safety precautions to be used. The topics discussed at the meeting, and the names and company affiliation of the attendees shall be noted in the project field notes. Supplemental meetings shall be conducted as needed to address changing work conditions.

(ii) The information described above shall be complemented with effective, on-going, on-the-job instruction from supervisors.

(b) **Excavation Work Practices**

(1) **Design.** Walls and faces of all excavations and trenches five feet or greater in depth, into which employees may descend, shall be guarded by sloping, shoring or shielding. Design of protective systems shall conform with accepted engineering practice, and applicable state and federal regulations. All design work shall be pre-approved by a registered professional engineer.

(2) **Installation.** The project manager, and site supervisor shall ensure that installation of protection systems conforms to accepted engineering practice, and applicable state and federal regulations. As necessary, the design engineer shall visit the site to assure proper installation of the protection system(s). Changes shall not be made in the system design without the approval of the design engineer.

(3) **Work Supervision.** Employees working in an excavation shall at all times be supervised. The supervisor shall remain outside the excavation at all times, and shall be responsible for identifying any unusual developments above ground which may warn of impending earth movements.

(4) **Inspections.** Frequent inspections of excavations shall be made by the project manager or site supervisor, both before the initial entry of each day (shift), and as work progresses. If there is any evidence of possible cave-ins or slides, all employees shall immediately exit the excavation, and all work in the area of the excavation shall cease until the necessary safeguards have been taken. Particular attention shall be paid following rainstorms or other earth de-stabilizing events.

(5) **Work Adjacent to Excavations.** Employees shall not work adjacent to any excavation until a reasonable examination of the excavation, and the surrounding area has been made to determine that no conditions exist that may expose them to injury from moving ground. Special precautions shall be taken at excavations adjacent to railroad tracks, streets, or other sources of vibration or superimposed loads.

(6) **Hazard Prevention Reinforcement.** Employees shall be reminded daily, prior to the start of the workshift, of the hazards associated with excavations. Signs of potential earth movement shall be brought to the immediate attention of the site supervisor.

(7) **Confined Space Work.** Excavation work that requires employee entry into a confined space shall be performed in compliance with Procedure No. S&H-101.

(8) **Unauthorized Entry.** No employees shall be permitted to enter the excavation unless they are specifically required to do so. Unauthorized persons shall not be allowed access.

(9) **Soil Placement.** All soil shall be located at least two feet from the edge of the excavation to prevent it from falling into the excavation. Since surface subsidence indicators, such as fissures or cracks, usually occur within a 4-foot distance from the edge of the excavation, due consideration must be given to placing soil at a greater distance from the edge, so that surface indicators are not obscured. No method that disturbs the soil in place (such as driving stakes) shall be used to contain the soil.

(10) **Worksite Guarding.** Excavations shall be guarded on all sides with wooden or metal barricades that are linked with yellow, or yellow and black barricade tape. The barricade shall be placed at a minimum distance of 7 feet from the edge of excavation.

(11) **Battery-Lighted Barricades.** Battery-lighted barricades shall be used as follows:

(i) A minimum of two lighted barricades shall be used at corners, one on either side of the barricade.

(ii) At least one lighted barricade shall be used where vehicular traffic approaches the trench at right angles.

(iii) Where excavations parallel roadways, the distance between lighted barricades shall not exceed 40 feet.

(iv) All lighted barricades shall be serviced as necessary to ensure the equipment is operational.

(12) **Entry and Egress.** Safe means of entry and egress from excavations shall be provided. This may be a ladder, stairway, or ramp securely fastened in place. Where ladders are used, the side rails of the ladder shall extend at least 3 feet above the edge of the excavation. Means of egress shall be located so as to require no more than 25 feet of lateral travel for employees.

(13) **Walkways and Bridges.** Excavations shall be crossed only where safe crossings can be provided. When the depth of the excavation exceeds 6 feet, walkways and bridges shall have standard guardrail (42 inches high, with midrail, and able to withstand a 200-pound lateral load), and toeboards.

(14) **Pedestrian Bridges.** Pedestrian bridges shall be of sufficient strength to prevent a vertical deflection greater than 0.5 inch when a weight of 250 pounds is applied in the center.

(15) **Vehicle Bridges.** Bridges intended for vehicles shall be designed to safely support twice the load of the heaviest vehicle anticipated.

(16) **Operating Equipment.** Employees working near operating excavation equipment shall not be permitted to work in locations that place them in danger of being struck by the moving equipment.

(17) **Undermining.** No structures or utilities may be undermined without the approval of a registered professional engineer.

(18) **Housekeeping.** The work area around an excavation shall be kept as free as possible of unnecessary equipment and clutter. In addition, Procedure No. S&H-109 shall be applied for general housekeeping practices.

(19) **Water Entry and Drainage.** Appropriate measures shall be taken to prevent surface water from entering the excavation, and to provide adequate drainage of the area adjacent to the excavation. Accumulation of water or other fluids in or around the excavation shall not be permitted.

(20) **Backfilling.** All excavations, test pits, exploratory wells, etc., shall be backfilled as soon as work has been completed, and all associated equipment removed.

7. EXHIBITS

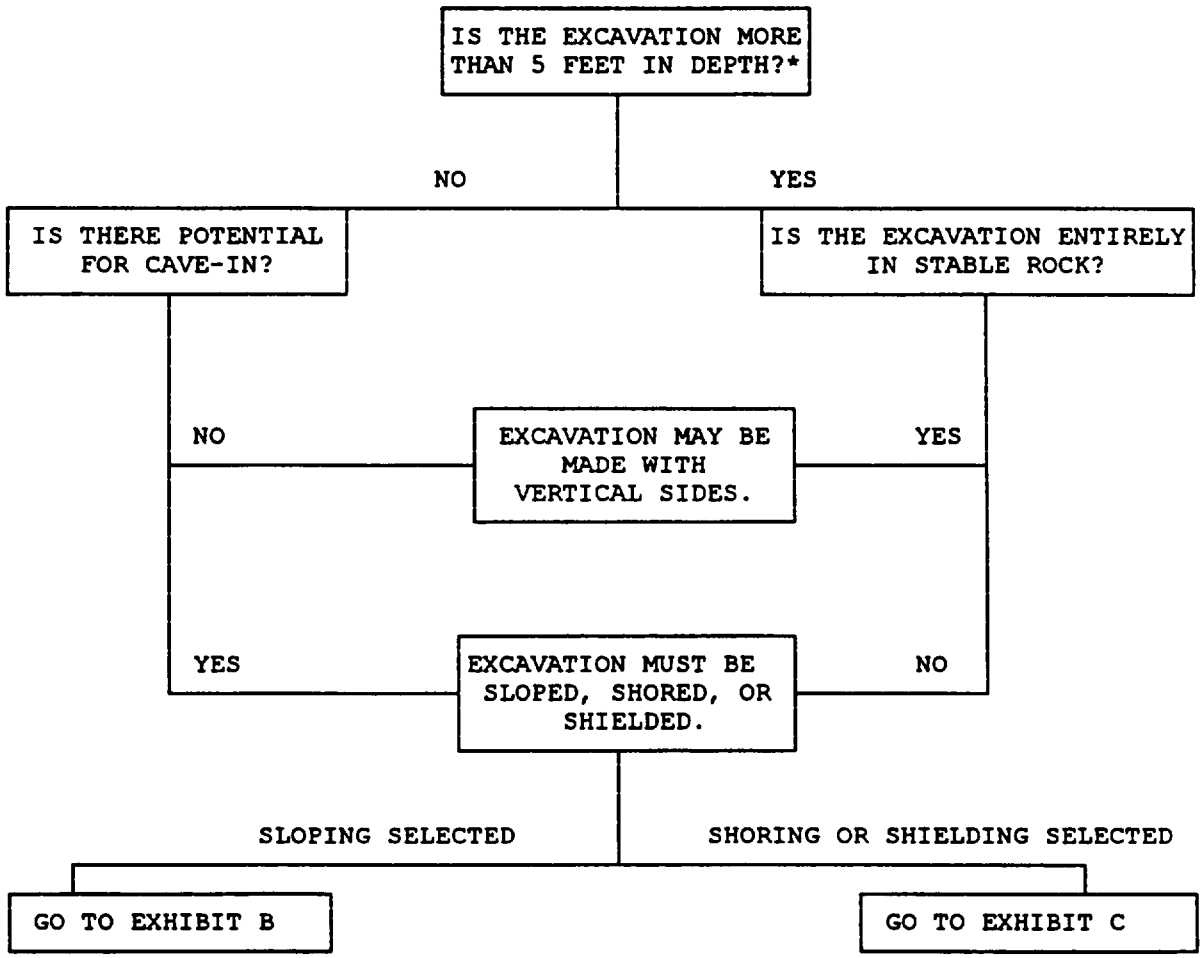
The following exhibits shall be used in selecting the proper protection system and documenting activities associated with this procedure.

Exhibit A: Selection of Protection System - Preliminary Decision Flowsheet
Exhibit B: Sloping Options
Exhibit C: Shoring or Shielding Options
Exhibit D: Excavation Notification Worksheet

Requirements for record distribution, retention, and maintenance shall be established within applicable project planning documents.

EXHIBIT A

SELECTION OF PROTECTION SYSTEM
PRELIMINARY DECISIONS FLOWSHEET



*FOR EXCAVATIONS LESS THAN 20 FEET DEEP. PROTECTIVE SYSTEMS FOR EXCAVATIONS DEEPER THAN 20 FEET MUST BE DESIGNED BY A REGISTERED PROFESSIONAL ENGINEER IN ACCORDANCE WITH 29 CFR 1926.652(b) AND (c).

EXHIBIT B

SLOPING OPTIONS

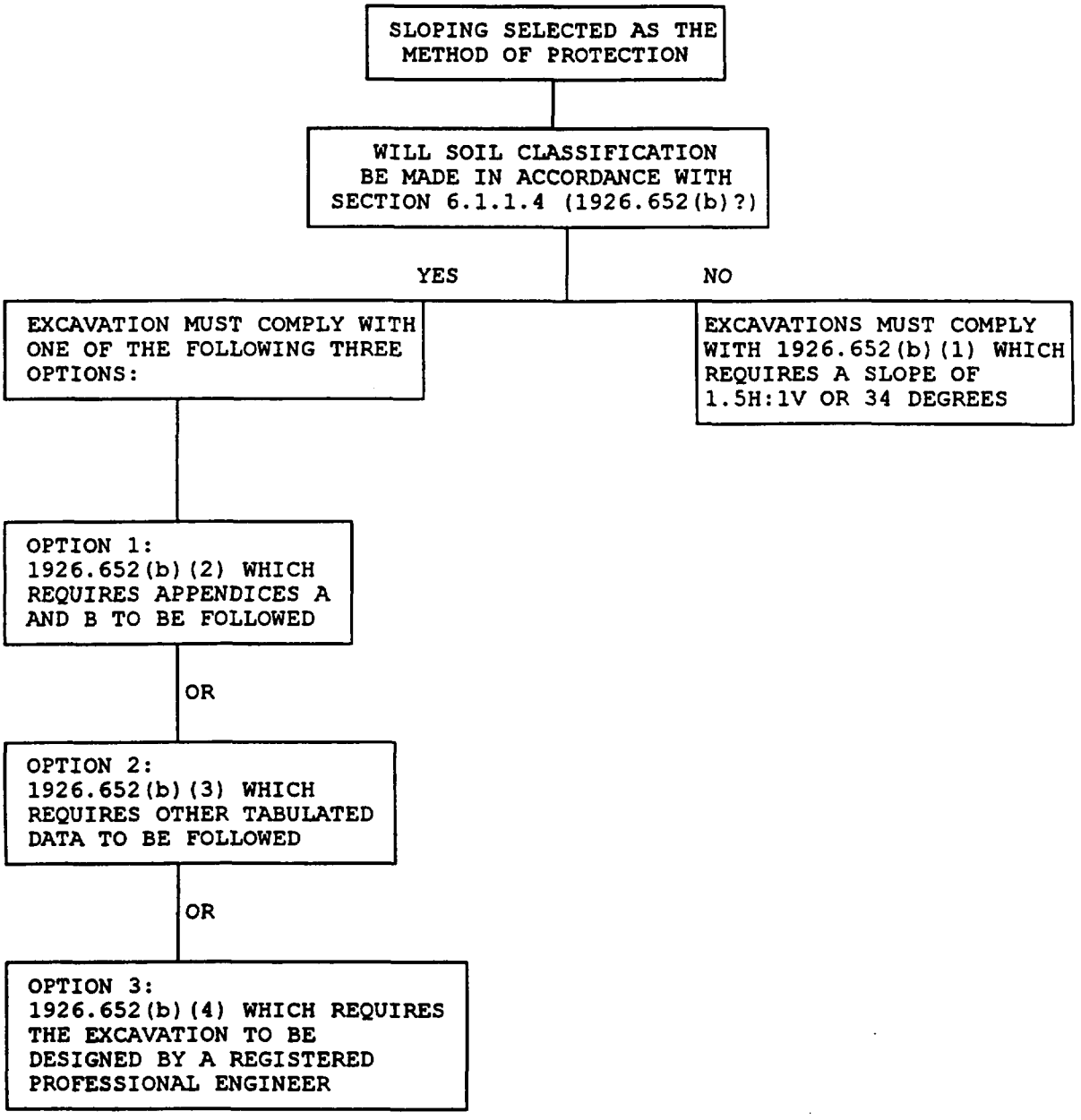


EXHIBIT C

SHORING OR SHIELDING OPTIONS

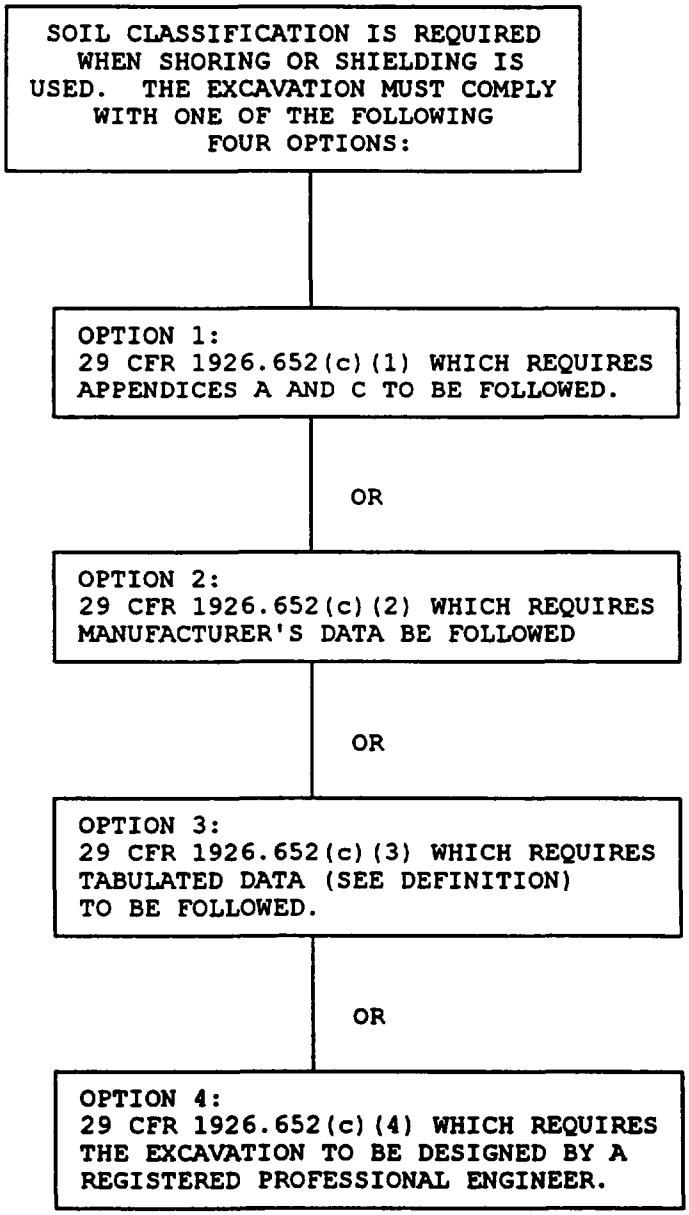


EXHIBIT D

EXCAVATION NOTIFICATION WORKSHEET

Client Name _____

Project Location _____

Nearest Major Cross Street _____

Project Manager _____

Start Date _____ Estimated Completion Date _____

Project Description _____

_____

_____

High Voltage Lines in Proximity: YES _____ NO _____ How Near _____feet

Excavation Depth Range (feet) _____ _____ Width Range _____ _____ Length _____
(min) (max) (min) (max)

Protective System Method Sloping _____ Shoring _____ Shield _____ Other _____

ALL METHODS MUST MEET ACCEPTED ENGINEERING REQUIREMENTS
PLANS MUST BE KEPT ON SITE

Design Engineer _____

Chemical Hazards at Site: _____

_____

Excavation Equipment to be Used: _____

_____

Subcontractor's Name (If applicable): _____

_____

TITLE: PORTABLE ELECTRICAL EQUIPMENT

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to perform activities associated with portable electrical equipment.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser operations unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Hazardous Location**

Locations where flammable vapors, liquids, gases, or combustible dusts or fibers may be present. Classification of hazardous locations is made based on the likelihood of a flammable concentration or quantity being present. Six designations of hazardous locations are made:

(1) Class I, Division 1

(2) Class I, Division 2

(3) Class II, Division 1

(4) Class II, Division 2

(5) Class III, Division 1

(6) Class III, Division 2

Detailed definitions of these six hazardous locations are given in 29 CFR 1910.399 and in the National Electrical Code (NEC 70-500).

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) Electrical equipment must be free from recognized hazards.

(b) Unless approved for the purpose, no electric conductors or equipment may be:

- Located in damp or wet locations.
- Exposed to gases, fumes, vapors, liquids, or other agents which could have a deteriorating effect.
- Exposed to elevated temperatures.

(c) All electrical equipment must be marked with the manufacturer's name or other identifying description. Other markings shall provide voltage, current, wattage, or other applicable ratings.

6. IMPLEMENTATION

(a) Cord and Plug Equipment

(1) **Type of Equipment.** Cord and plug sets containing exposed metal parts shall not be used. Non-metallic cord and plug sets with ground connections shall be used, unless the equipment is double-insulated and grounding is not required. Double-insulated equipment shall be distinctively identified. Common examples of this equipment include:

- Portable hand-held motor operated tools e.g., drills, sanders and saws.
- Portable electric equipment used in damp or wet locations.
- Portable equipment used in hazardous locations.
- Portable hand lamps.

(2) **Grounding Methods.** Cord and plug equipment shall be grounded by one of the following methods:

- By means of the metal enclosure of the conductors supplying such equipment if a grounding-type attachment plug with one fixed grounding contact is used for grounding the metal enclosure, and if the metal enclosure of the conductors is secured to the attachment plug and to the equipment by connectors approved for the purpose.
- By means of a grounding conductor run with the power supply conductors in a cable assembly or flexible cord properly terminated in a ground-type attachment plug with one fixed ground contact.
- By means of a separate flexible wire or strap, insulated or bare, protected as well as practicable against physical damage.

(3) **Multi-Outlet Power Cords.** Multi-outlet power cords (power strips) may be used only under the following conditions:

- The total current (start-up amps) of all equipment connected to the power strip must not exceed the rated capacity of the power strip or of the circuit into which the power strip is connected.
- Power strips may not be used in series (pig-tailed).
- Only one power strip may be connected to a single outlet receptacle.
- With a ground fault circuit interrupter (GFCI) protected outlet.

(b) **Portable Hand Lamps**

(1) Hand lamps shall be equipped with a handle of molded composition or other material approved for the purpose.

(2) Hand lamps shall be equipped with a substantial guard around the lamp, attached to the lamp holder or the handle.

(3) Metallic guards shall be grounded by means of an equipment grounding conductor run with circuit conductors within the power supply cord.

(4) Hand lamps may not contain plug receptacles.

(5) Portable lighting used in wet or conductive locations, such as tanks or boilers, must be operated at no more than 12 volts, or must be protected by ground fault circuit interrupters (GFCIs).

(c) **Flexible Cords and Cables**

(1) Flexible cords and cables (extension cords) must be of the three-wire type, with dead front plugs and receptacles. A fixed ground connection must be present. Cords used with temporary or portable lights must be designed for hard or extra hard usage (types S, ST, or SO).

(2) Flexible cords and cables may not be used as a substitute for the fixed wiring of a structure. Permitted uses include:

- Connection of portable lamps or appliances
- Connection of stationary equipment to facilitate their frequent interchange
- Connection of fixed or stationary appliances where the fastening means and mechanical connections are designed to permit removal for maintenance or repair.

(3) Flexible cords and cables may not pass through windows, doorways, or openings in walls, ceilings, or floors.

(4) Flexible cords and cables shall be protected from accidental damage.

(5) Flexible cords and cables, where permitted, shall be attached so that strain or pull is not transmitted to joints or terminal screws.

(6) Worn, frayed, or damaged electrical cords shall not be used. Cords may not be attached to building surfaces, hung from nails, or suspended by wire.

(7) Receptacles, cord connectors, and plugs shall not accept an attachment with a piece of equipment or a device of different voltage or current rating than that for which the equipment/device is designed. Non-grounding receptacles shall not accept grounding-type attachment plugs.

(8) Splices and repairs shall be made only by qualified personnel. All splices or repairs shall be made so that the insulation on the repaired section is equivalent to the original insulation rating of the device.

(d) **Grounding**

(1) The path to ground from circuits, equipment, and enclosures must be permanent and continuous.

(2) Electrical installations at project sites must be protected by either an assured equipment grounding conductor program, or GFCIs. The two options are:

- All 120-volt single phase, 15- and 20-amp receptacles that are not part of permanent wiring must be protected by GFCIs.

- The assured equipment grounding conductor program must cover extension cords, receptacles, and cord- and plug-connected equipment. The program must include the following elements:

    - A written description of the program.
    - At least one competent person to implement the program.
    - Daily visual inspections of extension cords, and cord- and plug-connected equipment for defects (see Exhibit A for a sample inspection program). Equipment found damaged or defective shall be removed from use, and not used until repaired.
    - Continuity tests of the equipment grounding conductors or receptacles, extension cords, and cord- and plug-connected equipment every three months.
    - Compliance with the requirements for grounding of systems, circuits, and equipment (see 1926.404).

(3) If the assured equipment grounding conductor program option is chosen, inspection records shall be maintained by the designated competent person at the site.

7. EXHIBITS

Exhibit A: Sample Electrical Equipment Inspection Program

EXHIBIT A

SAMPLE ELECTRICAL EQUIPMENT INSPECTION PROGRAM

Maintenance of portable electrical equipment shall be performed at regular intervals, not to exceed three months, by qualified personnel. A maintenance log shall be maintained for all equipment in the program, and the equipment shall be tagged or marked to indicate its inspection status.

A. DAILY INSPECTION REQUIREMENTS

Each cord set, attachment cap, plugs, and receptacles of cord sets, and any equipment connected by cord and plug, including those that are not required to be grounded, shall be visually inspected for external defects, such as deformed or missing pins or insulation damage, and for indication of possible internal damage. Equipment found damaged or defective shall be removed from service until repaired.

B. PERIODIC INSPECTION GUIDELINES

The following guidelines shall be followed when performing the periodic inspections of portable electrical equipment. In addition, Steps (1), and (2) shall be performed before the first use of any new equipment, before equipment is returned to service following repairs, and before equipment is used following any incident that may have damaged it.

1. **General Inspection Procedure**

   a. Check the general condition of the equipment.

   b. Look for loose fasteners, broken or cracked housings or casings, loose or broken switches.

   c. Check the power cord carefully for cracks or deterioration of the insulation.

   d. If the attachment plug is not a dead-front type, replace it.

   e. Check the operation of ground fault circuit interrupters if so equipped.

   f. Take the device out of service if any defects cannot be immediately remedied.

2. **Continuity Test**

   Steps a, b, and c do not apply to double-insulated tools.

   a. Use a resistance meter (multi-meter) set on the R x 1 scale.

b. Attach one lead to the ground prong of the attachment plug, and the other lead to an exposed metal part of the device's housing.

c. The meter should read less than 10 ohms to pass.

d. Next attach one lead to each of the two flat line blades of the attachment plug.

e. The meter should read less than 10 ohms to pass.

f. If the unit fails either of these tests, take it out of service, and tag it for repair.

3. **Insulation Test**

This test does not apply to double-insulated tools.

a. Attach one lead of the test meter to one of the flat line blades on the attachment plug, and the other lead to an exposed metal part of the device's housing.

b. The meter should read greater than 1 megohm (1,000,000) to pass.

c. If the unit fails the test, take it out of service, and tag it for repair.

4. **Portable Hand Lamps**

In addition to the three steps above, portable hand lamps shall comply with the following test:

a. The wattage of the lamp (bulb) shall not exceed the rating of the device.

b. The bulb guard must be complete, and in place as designed. The Continuity Test described in step 2 above must be performed on hand lamps with metal bulb guards. To perform the test, one lead from the meter shall be attached to the bulb guard, and the other lead to the ground prong of the attachment plug.

c. The meter shall read less than 10 ohms to pass.

d. If the unit fails the test, take it out of service, and tag it for repair.

e. If the hand lamp is an approved explosion-proof type, the bulb guard, bulb cover, and gasket(s) shall be inspected for damage or defects. If the

device fails the inspection, it shall be taken out of service, and repaired according to the manufacturer's requirements.

5. **Inspection Records**

Records of inspections shall be maintained. The record shall include at least:

a. The identity of the device inspected.

b. The date of the inspection.

c. The inspector's name or employee number.

d. The inspection results (and date of return-to-service if repairs are made).

e. The due-date of the next inspection.

200513

TITLE: USE, HANDLING, AND STORAGE OF LADDERS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to use, handle, and store ladders.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

Not applicable.

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

The following are minimum requirements for the use and care of ladders by ICF Kaiser personnel. Compliance is also required with ANSI A14.1, ANSI A14.3, and applicable State Regulations.

(a) Ladders shall be maintained in good condition at all times. Those that are defective in any way shall be removed from service and tagged with an unsafe equipment tag until made safe for use or destroyed.

(b) Ladders purchased for use on ICF Kaiser sites shall be appropriate for industrial applications (Class 1-A). Light-duty household ladders are not acceptable.

(c) Ladder safety devices may be used in lieu of cage protection on ladders of unbroken length.

(d) Landing platforms are not required in these cases except at regular step-off points. All ladder safety devices shall be compatible with the ladders with which they are used.

(e) Fixed ladders shall be installed wherever regular access by ladder is necessary.

(f) Metal ladders shall not be used where potential electrical hazards exist.

(g) Ladders having metal parts (other than hardware) shall not be used where potential electrical hazards exist unless they bear a manufacturer's label that indicates:

- The ladder complies with ANSI 14.5.
- It is approved for electrical use.

(h) Job-made ladders shall be constructed in accordance with OSHA 1926.1053.

(i) All personnel involved in the use of ladders on the project shall be instructed to the requirements of this procedure in accordance with Procedure No. S&H-006.

6. IMPLEMENTATION

(a) Use of Ladders

(1) Ladders shall be inspected by the user before each use.

(2) Straight ladders shall be tied, blocked, and equipped with safety shoes, or otherwise secured to prevent displacement.

(3) Straight ladders shall be used at an angle of approximately 75 degrees from the horizontal. (This position may be readily established by placing the base of the ladder 1/4 of its working length from the vertical plane of the top support.)

(4) When working from a ladder, the ladder shall be secured at both top and bottom.

(5) No type of work requiring the use of both hands shall be performed on a ladder over 10 feet from the ground or floor unless a safety belt is worn and the safety lanyard is secured.

(6) No objects that restrict the use of both hands for climbing shall be carried in the climber's hands.

(7) A ladder shall not be placed in front of a door opening toward the ladder unless the door is blocked open, locked, or guarded.

(8) Ladders must only be used on firm, stable bases. Ladders shall not be placed on boxes, barrels, or other unstable bases to form longer sections.

(9) Ladders shall not be spliced together to form longer sections.

(10) Ladders used to gain access from one level to another shall be long enough for the top to extend 3 feet above the landing or suitable grab rails, for safe moving to or from the point of access.

(11) The platform and top step of ordinary types of stepladders shall not be used as steps.

(12) Stepladders shall not be used as straight ladders, and shall be used with legs fully extended.

(b) **Care of Ladders**

(1) Ladders shall be handled with care and not be subjected to unnecessary abuse or misuse.

(2) Immediate inspection and appropriate maintenance is required of any ladder exposed to fire, subjected to damaging chemicals, involved in a fall or collision, or which has become coated with oil or grease.

(3) When not in use, ladders shall be stored where they are protected from potential damage by collision, temperature, moisture, etc.

(4) Users shall return ladders to proper storage location when the job is completed.

(5) Ladders shall not be painted.

7. EXHIBITS

Not applicable.

TITLE: WELDING, CUTTING, AND HOT WORK

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to perform activities associated with welding, cutting, and hot work.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Hot Work**

A work activity that by the nature of the operation, e.g., grinding, burning thermocutting/welding, etc., creates an open source of ignition.

(b) **Hot Work Control Areas**

Fire hazardous areas such as cable spreading rooms, cable trays, conveyor galleries, rubber-lined piping equipment and structures, potentially explosive atmospheres, and similar hazardous hot work areas identified by project safety personnel.

(c) **Hot Work Permit**

Document issued prior to the start of hot work which is used to verify the presence of appropriate fire prevention and protection measures.

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) Equipment shall be used only for operations for which it is approved, and as recommended by the manufacturer.

(b) Workers assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment shall be thoroughly instructed in the safe use of such equipment by a qualified person.

(c) Engineering controls shall be implemented to control hot work hazards to the extent feasible.

(d) Before any cutting or welding is performed, the area shall be inspected by the supervisor responsible for authorizing hot work. When appropriate, a written hot work permit shall also be completed to designate specific approvals needed and precautions to be taken.

(e) Personnel performing activities in accordance with this procedure shall be instructed to applicable requirements as indicated within Procedure No. S&H-006.

6. IMPLEMENTATION

(a) Gas Welding and Cutting Safety

(1) Fuel-gas hoses and oxygen hoses shall be easily distinguishable from each other. The contrast shall be made by different colors or by surface characteristics readily distinguishable by touch. Oxygen and fuel-gas hoses shall not be interchangeable. A single hose having more than one gas passage shall not be used.

(2) When parallel sections of oxygen and fuel-gas hose are taped together, not more than 4 inches out of 12 inches shall be covered by tape.

(3) All hoses in use shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.

(4) Hoses, cables, and other equipment shall be kept clear of walkways, ladders, and stairs.

(5) Clogged torch tip openings shall be cleaned with approved cleaning wires, drills, or other devices designed for this purpose.

(6) Torches to be used shall be inspected at the beginning of each working shift for leaking shutoff valves, damaged hose couplings, and clogged tip connection. Defective torches shall not be used.

(7) Torches shall be ignited by friction lighters or other approved devices only. Matches, flame lighters, or hot work shall not be used to ignite a torch.

(8) Oxygen and fuel-gas pressure regulators, including related gauges, shall be in proper working order.

(9) All oxygen cylinders and fittings shall be kept away from oil or grease. Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves. Oxygen shall not be directed at oily surfaces or greasy clothes, or used within a fuel oil or other storage tank or vessel.

(10) Torches and hoses shall be completely depressurized (bled) of pressurized gas, prior to storage, or at the end of each shift.

(11) Torches and hoses shall not be stored in enclosed areas (e.g., gang boxes, lockers) while connected to cylinders.

(12) Oxygen connections shall include a means to prevent backflow.

(13) Fuel gas cylinders shall be provided flash-back protection.

(b) **Arc Welding and Cutting Safety**

(1) Electrode holders which are designed for arc welding/cutting and are capable of safely handling the maximum rate current required shall be used.

(2) Any current-carrying parts passing through the holder which the arc welder or cutter grips in his/her hand, or the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

(3) All arc welding/cutting cables shall be completely insulated and flexible, capable of handling the maximum current requirements of the work.

(4) Only cables free from repair or splices for a minimum distance of 10 feet from the electrode holder shall be used. Cables with standard insulated connectors or splices with insulating quality that is equal to that of the cable is permitted.

(5) If it is necessary to splice lengths of cable, insulated connectors equivalent to that of the cable shall be used. If connections are made by cable lugs, they shall be securely fastened together and provide a good electrical contact. Exposed metal parts of the lugs shall be completely insulated.

(6) If electrode holders are left unattended, the electrodes shall be removed and the holder placed so that they cannot make electrical contact with employees or conducting objects.

(7) To avoid the possibility of electric shock, electrode holders shall not be dipped in water.

(8) When the arc welder or cutter leaves work, stops work for any length of time, or when the arc welding cutting machine is to be moved, the power supply to the equipment shall be turned off.

(9) Any faulty or defective equipment shall be reported to the supervisor and tagged out of service until repaired.

(10) All arc welding/cutting operations shall be shielded by noncombustible or flameproof screens to protect employees and other persons working in the vicinity from the direct ray of the arc.

(c) **Storage and Handling of Compressed Gas Cylinders**

(1) Compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such markings shall be stenciled, stamped, or labeled and shall not be easily removable.

(2) The marking shall be located on the shoulder of the cylinder.

(3) Compressed gas cylinders shall be equipped with approved connections.

(4) Acetylene cylinders shall be stored and used valve end up.

(5) Oxygen cylinders shall not be stored near highly combustible/flammable materials, especially oil or grease.

(6) Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), by a minimum distance of 20 feet, or by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least one half hour.

(7) Cylinders shall be not dropped, struck by objects, or permitted to strike each other violently.

(8) Cylinder valves shall be closed before moving cylinders.

(9) Cylinder valves shall be closed at the end of the shift or when work is finished.

(10) Valves of empty cylinder shall be closed.

(11) Cylinders shall be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames will not reach them.

(12) Cylinder valves shall always be opened slowly.

(13) An acetylene cylinder valve shall not be opened more than one and one-half turns of the valve stem and preferably no more than three-fourths of a turn.

(14) Where a special wrench is required to operate a cylinder valve, it shall be left in position on the stem of the valve while the cylinder is in use. In the case of manifolded or coupled cylinders, at least one such wrench shall be available for immediate use.

(15) Regulators shall be removed, valve caps in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders shall have a proper support rack installed.

(16) A suitable cylinder truck, chain, or other steadying device shall be used to prevent cylinders from being knocked over while in use or storage.

(17) Cylinders shall not be placed where they may become part of an electric circuit. Tapping of an electrode against a cylinder to strike an arc shall be prohibited.

(d) **Personal Protective Equipment**

(1) **Selection and Use.** Selection and use of personal protective equipment shall comply with Procedure No. S&H-202.

(2) **Eye and Face Protection.** Eye and face protection shall comply with the following:

(i) Welding helmets and hand shields shall be used during all arc welding/cutting operations, excluding submerged arc welding. Safety goggles or glasses (with side shields) shall also be worn during arc welding/cutting operations. The goggles or glasses may be either clear or colored glass, depending upon the type of exposure in welding operations. Helpers or attendants shall wear proper eye protection.

(ii) Safety goggles or glasses with side shields and suitable filter lenses are permitted for use during gas welding operations on light work, torch brazing, or inspection.

(iii) All operators and attendants on resistance welding or brazing equipment shall use face shields or goggles, depending on the particular job.

(3) **Protective Clothing.** Hot work shall require the following protective clothing:

(i) Except when engaged in light work, all welders shall wear flameproof gauntlet gloves.

(ii) Flameproof aprons made of leather, or other suitable material, may also be desirable for protection against radiated heat and sparks.

(iii) Woolen clothing shall be worn in preference to cotton because it is not so readily ignited. Nylon clothing is not permitted for welding/cutting operations.

All outer clothing, such as jumpers or overalls, shall be reasonably free from oil or grease.

(4) **Respiratory Protective Equipment**. Respiratory protective equipment shall comply with the following:

(i) Respiratory protective devices shall be required when one or more of the following conditions exist:

- Feasible engineering controls are insufficient to mitigate the hazards.
- Room size (with special regard to ceiling height) is limited, or welding/cutting work is extensive and ventilation is limited.
- Several welders are working in the area at the same time.
- Potentially unsafe atmospheric conditions exist.
- Too much heat is generated.
- Hazardous fumes, gases, or dusts of toxic metals, particularly lead, cadmium, chrome, beryllium, and zinc are present in the base metal or in coatings.

(ii) Respiratory protective equipment shall be selected, used, and maintained in accordance with Procedure No. S&H-203.

(e) **Mechanical Ventilation**

(1) Mechanical ventilation shall consist of either general dilution systems or local exhaust systems. Local exhaust systems are preferred.

(2) General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fume and smoke within safe limits.

(3) General ventilation may not be used as the only means of control when toxic metals are involved in the operation.

(4) Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits.

(5) Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air. Environmental regulations may require filtering or other cleaning of exhausted air.

(6) All makeup air shall be clean and suitable for breathing.

(7) Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.

(8) The field safety and health staff shall be consulted for appropriate methods and controls in the case of specific requirements (including welding rods and fluxes, paints and coatings) for materials containing zinc, lead, mercury, beryllium, cadmium, and stainless steel to be cut, heated, and/or welded.

(f) **Fire Protection**

(1) When possible, objects to be welded, cut, or heated shall be moved to a designated safe location. If this is not possible, all movable fire hazards in the work space shall be taken away to a safe place.

(2) If the object to be welded, cut or heated cannot be moved and all fire hazards cannot be removed (e.g., equipment, walls, floors, etc.), positive means shall be taken to confine the heat, sparks, and slag to protect the immovable fire hazards as well as opposite sides.

(3) No welding, cutting, or heating shall be done where the application of flammable paint, the presence of other flammable compounds, or heavy dust concentration create a possible hazard.

(4) Wherever there are openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no sparks will drop through the floor. The same precautions shall be taken in the presence of cracks or holes in walls, open doorways, and open or broken windows.

(5) Approved fire extinguishing equipment shall be present in the immediate work area.

(g) **Fire Watch**

(1) A fire watch shall be maintained for at least 30 minutes after completion of welding/cutting operations so that possible smoldering fire can be detected and extinguished.

(2) Fire watchers shall have fire extinguishing equipment readily available and be trained in its use.

(3) They shall be familiar with facilities and procedures in the event of a fire. They shall watch for fires in all exposed areas and attempt to extinguish them only when obviously within the capacity of the equipment available. The Fire Department shall be immediately notified of all fires.

(h) **Welding/Cutting on Containers**

(1) **Used containers.** No welding, cutting, or other hot work shall be performed on empty drums, barrels, tanks, or other containers until they have been thoroughly cleaned. (This is to ensure that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which, when subjected to heat, might produce a hazard.) Any connection to the drum or vessel shall be disconnected or blanked off.

(2) **Venting and Purging.** All hollow spaces, vacancies, or containers shall be ventilated to remove gases before preheating, cutting, or welding. Purging with inert gas is recommended.

(i) **Welding/Cutting in Confined Spaces.** Welding/cutting in confined spaces such as, but not limited to, a tank, boiler, pressure vessel, or small compartment shall require the following precautionary measures:

- Local exhaust ventilation shall be provided, unless supplied-air respirators are worn by workers.
- Gas cylinders and/or welding machines shall be placed outside the confined space.

(j) **Manifolding of Cylinders**

(1) Cylinder manifolds shall be installed under the supervision of an experienced person(s) and must comply with proper practices in construction and use.

(2) All manifolds and parts shall be appropriate for the gases for which they are approved.

(3) When acetylene cylinders are manifolded, approved flash arresters shall be installed between each cylinder and the coupler block. One flash arrestor installed between the coupler block and regulator is acceptable only for outdoor use or if the number of cylinders coupled does not exceed three.

(4) Each cylinder lead shall be provided with a backflow check valve.

7. EXHIBITS

Exhibit A - Hot Work Permit

A Hot Work Permit shall be used for documenting activities associated with this procedure. Requirements for record distribution, retention, and maintenance shall be established within applicable project planning documents.

EXHIBIT A
HOT WORK PERMIT

Date: _____ Location (Be Specific): _____
Describe work to be done: _____

_____

PRELIMINARY INSPECTION

Before approving any cutting and welding permit, the Field Safety and Health Staff or designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with project requirements.

PRECAUTIONS:
___ Cutting and welding equipment in good repair.

WITHIN 35 FEET OF WORK:
___ Floors swept clean of combustibles.
___ Combustible floors wet down, covered with damp sand, metal or other shields.
___ No combustibles and flammables.
___ Combustible and flammable liquids protected with covers, guards or metal
___ All wall and floor openings covered.
___ Covers suspended beneath work to collect sparks.

WORK ON WALLS OR CEILINGS:
___ Construction with noncombustible material or covering.
___ Combustibles moved away from opposite side of wall.
___ Special Precautions Taken (Indicate)

CONFINED SPACE:
(Tanks, containers, dust collectors, etc.)
- Equipment cleaned of all liquid combustibles.
- Containers purged of flammable vapors.
- Test equipment available.

FIRE WATCH:
- To be provided during and 30 minutes after operation.
- Supplied with extinguisher and small hose.
- Fire watcher trained in use of equipment and in sounding fire alarm.

_____

_____

The location where this work is to be done has been examined, necessary precautions taken, and permission is granted for this work.

Permit expires: _____

Signed _____
(Individual responsible for authorizing welding and cutting)

Time started _____ Completed _____

FINAL CHECK-UP AFTER COMPLETION OF HOT WORK

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite side of walls) were inspected 30 minutes after the work was completed AND WERE FOUND FIRESAFE.

Signed _____
(Supervisor of Fire Watch)

TITLE: HEARING CONSERVATION PROGRAM

1. PURPOSE

To establish the minimum requirements for the ICF Kaiser Engineers (ICF Kaiser) Hearing Conservation Program.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Ambient Noise (Residual Noise, Background Noise)**

Noise of a measurable intensity that is normally present in the background in a given environment.

(b) **Audiogram**

A chart, table, or graph resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.

(c) **Audiologist**

A professional specializing in the study of rehabilitation of hearing, who is certified by the American Speech, Hearing and Language Association or licensed by a state board of examiners.

(d) **Auditory Trauma**

Damage to the hearing mechanism resulting in some degree of permanent or temporary hearing loss. Auditory trauma may be caused by agents other than noise; e.g., head injury; burns; sudden or excessive changes of atmospheric pressure.

(e) **A-Weighted Sound Level**

A single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response.

(f) **Baseline Audiogram**

The audiogram against which future audiograms are compared.

(g) **Decibels - A-Weighted (dBA)**

A unit of measurement of sound level corrected to the A-weighted scale, as defined in ANSI S1.4 - 1981 (R 1976), using a reference level of 0.00002 Newton per square meter.

(h) **Dosimeter**

An instrument which registers the occurrence and cumulative duration of noise exceeding a predetermined level at a chosen point in the environment or on a person.

(i) **Earmuff**

An HPD that encloses the entire outer ear.

(j) **Earplug**

An HPD, having specified or standard acoustic characteristics, which upon insertion occludes the external auditory meatus.

(k) **Frequency**

The number of times per second that a sine wave repeats itself. It is expressed in hertz (Hz) or cycles per second (cps).

(l) **Hearing Impairment**

Hearing loss exceeding a designated criterion (commonly 25 decibels (dB), re International Safety Operations (ISO) standard, averaged from the threshold levels at 500, 1,000, and 2,000 Hz).

(m) **Hearing Protective Device (HPD)**

A device inserted into or placed over the ear in order to attenuate air-conducted sounds.

(n) **Impulse Noise (Impact Noise)**

Noise of short duration (typically, less than one second) especially of high intensity, abrupt onset and rapid decay, and often of rapidly changing spectral composition.

(o) **Medical Pathology**

A disorder or disease affecting the ear, which should be treated by a physician specialist.

(p) **Noise Reduction Rating (NRR)**

A rating system for hearing protective devices developed by the Environmental Protection Agency. The NRR is a measure of the ability of a given protective device to attenuate noise, as a function of noise intensity and frequency. The NRR must be shown on the hearing protector package.

(q) **Otolaryngologist**

A physician specializing in diagnosis and treatment of disorders of the ear, nose, and throat.

(r) **Representative Exposure**

Measurements of an employee's noise dose or 8-hour time-weighted average sound level that the employers deem to be representative of exposures of other employees in the workplace.

(s) **Standard Threshold Shift (STS)**

As defined by OSHA, a change in hearing threshold relative to the baseline audiogram of 10 dB or more at 2,000, 3,000, and 4,000 Hz in either ear, corrected for aging (presbycusis).

(t) **Sound Level**

Ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of 20 micropascals, given in decibels (dB). For use with the directive, slow time response, in accordance with ANSI S1.,4-1971 (S 1976), is required.

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) Factors Considered

To assess employee noise exposure, the following factors shall be considered:

- **The overall decibel level of the noise exposure.** If a noise exposure does not cause auditory fatigue, the exposure is not considered harmful to hearing sensitivity.
- **The frequency spectrum of the noise.** Noise exposure in the high frequency ranges is generally more harmful than low frequency noise.
- **The daily time distribution of the noise exposure.** Noise which is intermittent in character is generally less harmful to hearing than steady-state noise exposure. The potential for hearing loss increases as a function of the duration of the exposure over a working lifetime.
- **The susceptibility of the worker to hazardous noise.** Not every individual will develop identical hearing impairment if exposed to the same noise intensity over the same time period.
- **The extra-auditory (or nonauditory) effects of noise.** While evidence to support extra-auditory health effects may not be as complete as the case for hearing loss, some concern exists. Noise can alter the normal functions of the endocrine, cardiovascular, and neurological systems. Subjective complaints of nausea, malaise, and headache have been reported in workers exposed to ultrasonic noise levels.

(b) Hearing Conservation Program

(1) A hearing conservation program shall be implemented and protection against the effects of noise exposure shall be provided when the noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 decibels measured on the A-weighted scale of a standard sound level meter at slow response.

(2) For compliance purposes as regulated by OSHA, an effective hearing conservation program shall include as a minimum:

- Monitoring of the workplace to determine the representative exposure of employees to excessive noise levels.
- An audiometric testing program, which shall include:
  - A baseline audiogram for all employees exposed to noise levels equal to or in excess of the standard.
  - Annual audiograms for each overexposed employee.

- Analysis of audiogram results with retesting and/or referral to an otolaryngologist or qualified physician when a significant threshold shift (STS) occurs.
- Written employee notification of the STS.

- A training program for all employees exposed to noise levels of this standard performed in accordance with Procedure No. S&H-006.

(i) Provision of personal protective equipment to all affected employees when administrative or engineering controls fail to reduce sound levels to within the levels of the standards.

6. IMPLEMENTATION

(a) Monitoring

(1) Monitoring of employee exposures to noise shall be conducted by the field safety and health staff.

(2) The monitoring requirement may be met by either area monitoring or personal monitoring that is representative of employee exposures. Personal monitoring is preferred, and may be required based on the type(s) of noise sources.

(3) For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with Exhibit A of this procedure and without regard to any attenuation provided by the use of hearing protective equipment.

(b) Audiometric Testing

(1) Audiometric testing and an annual audiogram shall be provided as part of the regular medical examinations.

(2) Audiometric test results obtained from the prehire medical examination for new employees shall be used as the baseline audiogram.

(3) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise.

(4) Hearing protectors shall not be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(5) Employees shall be notified of the need to avoid high levels of non-occupational noise exposure during this 14-hour period.

(c) **Employee Training and Information**

(1) **Training Program.** A training program shall be established as follows:

- All employees who may be exposed to excessive noise levels shall complete a formal training program, which shall include, as a minimum, the following information:
  - The effects of noise on hearing.
  - The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care.
  - The specific nature of the operations which could result in exposure to excessive noise levels.
  - A description of the medical surveillance program, including a description of the purpose of audiometric testing, and an explanation of the test procedures.
  - The engineering controls and safe work practices associated with the employee's work assignment.
- The training program shall be repeated annually, and each employee receiving such training shall complete a Hearing Protection Training Completion Form. All training shall be documented in accordance with Procedure No. S&H-006.

(2) **Safety Meetings.** Job site safety meetings and site-specific health and safety plans shall include instruction on the need for hearing protective devices in designated areas. All safety meetings shall be in accordance with Procedure No. S&H-006.

(d) **Control Measures**

(1) **Examination of the Problem.** To control noise exposure, its three basic elements shall be examined, i.e., source of the sound, travel path, and effect on receiver or listener. Solution of a given noise problem might require alteration or modification of any or all of these three basic elements.

(2) **Noise Control at the Source.** Controlling noise at the noise source can be achieved by the following:

- Select quiet equipment initially. In selecting quiet equipment the following features shall be considered:
  - Low-noise certification.
  - Advertisement of "quiet" operation, evidence of noise control design.
  - Evidence of "lower" and "slower" operating characteristics.
  - Side-by-side noise testing of equipment.

- "On-site" or "in operation" inspection of mechanical equipment before purchase.

- Reduce operating noise by considering the following control measures:

  - Reduce impact or impulse noise by reducing weight, size, or height of fall of impacting mass.
  - Reduce speed in machines and flow velocities and pressure in fluid systems.
  - Balance rotating parts - to control machinery noise and vibration of fans, fly wheels, pulleys, cams, shafts, etc.
  - Reduce frictional resistance between rotating, sliding or moving parts in mechanical systems: frequent lubrication, proper alignment of moving parts; static and dynamic balancing of rotating parts; correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulley, etc.
  - Reduce resistance in air or fluid systems: use of low flow velocities, smooth boundary surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence noise.
  - Isolate vibration elements in machinery; install motors, pumps, etc., on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring, etc.
  - Apply vibration damping materials such as liquid mastic; pads of rubber, felt, foam or fibrous blankets; or sheet metal viscoelastic laminates or composites to vibrating machine surfaces.
  - Reduce noise leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

(3) **Noise Control in the Transmission Path.** This can be achieved by the following:

- Separate the noise source and receiver as much as possible.
- Use sound-absorbing materials on ceiling, floor or wall surfaces as close to the machine as possible.
- Use sound barriers and deflectors in the noise path.
- Use acoustical lining on inside surfaces of such passageways as ducts, pipe chases, or electrical channels.
- Use mufflers, silencers or snubbers on all gasoline or diesel engines, regardless of size; and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam or air are discharged into the open air.
- Use vibration isolators and flexible couplers where the noise transmission path is structureborne in character.

(4) **Protection for the Receiver.** When engineering controls fail to reduce the levels to within the levels specified in Exhibit A of this procedure the following measures shall be implemented:

(i) Personal protective equipment shall be provided and replaced as necessary at no cost to employees.

(ii) Supervisors shall ensure that hearing protective devices are worn by all employees who are exposed to a time-weighted average of 85 decibels or greater and who have experienced a significant threshold shift.

(iii) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable protectors.

(e) **Recordkeeping**

(1) The audiogram shall include:

- Name and job classification of the employee.
- Date of the audiogram.
- The examiner's name.
- Date of the last acoustic or exhaustive calibration of the audiometer.
- Employee's most recent noise exposure assessment.

(2) Audiometric test results shall be maintained in the employee's medical file.

(3) Noise exposure measurements made pursuant to Section 6.a above, shall be forwarded to the Vice President, Safety and Health for retention.

7. EXHIBITS

The following exhibits shall be used for documenting activities associated with this procedure.

Exhibit A: Permissible Noise Exposure
Exhibit B: Hearing Protection Training Record

EXHIBIT A

PERMISSIBLE NOISE EXPOSURE
Per 29 CFR 1910.95

A-Weighted Sound Level (dB)	Permitted Duration Per Workday (Hours)	A-Weighted Sound Level (dB)	Permitted Duration Per Workday (Hours)
80	24+	106	0.87
81	24+	107	0.76
82	24+	108	0.66
83	21.1	109	0.57
84	18.4	110	0.50
85	16.0	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8.0	116	0.22
91	7.0	117	0.19
92	6.2	118	0.16
93	5.3	119	0.14
94	4.6	120	0.125
95	4.0	121	0.11
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2.0	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.038
104	1.1	130	0.031
105	1.0		

EXHIBIT B

HEARING PROTECTION TRAINING RECORD

NAME _____
(Please Print)

	INITIAL
1. I have been informed about the health hazards associated with exposure to excessive noise levels and the effect of noise on hearing.	
2. I have been informed about the types of work that may result in exposure to excessive noise levels, and the necessary protective steps to prevent exposure, including engineering controls and required safe work practices.	
3. I understand the purpose for, proper use and limitations of hearing protective devices, and I have received instruction on selection, fitting, use and care of such devices.	
4. I have been informed about the monitoring and medical surveillance programs, including information on audiometric testing and an explanation of the test procedures.	
5. I have received copies of the applicable regulations governing occupational exposure to excessive noise.	

Signature _____

Date _____

TITLE: BLOODBORNE PATHOGENS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to protect workers potentially exposed to bloodborne pathogens.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser operations unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Blood**

Human blood, human blood components, and products made from human blood.

(b) **Bloodborne Pathogens**

Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), and human immunodeficiency virus (HIV).

(c) **Exposure Incident**

A specific eye, mouth, other mucous membrane, non-intact skin (skin that is cut, abraded, etc.), or parenteral contact with blood or other potentially infectious materials that results from the performance of the employee's duties.

(d) **Other Potentially Infectious Materials**

Include: (1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between bodily fluids; (2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and (3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions, and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

(e) **Parenteral**

Introduced by piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

(f) **Source Individual**

Any individual, living or dead, whose blood or other potentially infectious materials may be a source of occupational exposure to an employee.

4. RESPONSIBILITIES

(a) The regional, or project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) Employees of ICF Kaiser Engineers are generally not required to render first aid to injured co-workers as part of their normal duties and responsibilities. Under this general case, the requirements set forth in Section 6 of this procedure apply. Training in first aid alone does not carry the requirement of actually providing emergency aid to an injured person.

(b) Where employees of ICF Kaiser are required to render first aid as part of their job duties, either due to contract requirements, or any other reason, a comprehensive Bloodborne Pathogens Exposure Control plan, employee training, and other controls as defined in 29 CFR 1910.1030, shall be implemented.

(c) Blood, and other potentially infectious materials, may be encountered at waste sites during investigative or remedial activities. Materials encountered at waste sites that are suspected of being potentially infectious ("red bags," sharps containers, syringes, bandages) shall be presumed pathogenic until proven otherwise. In this case, the site specific health and safety plan shall include necessary exposure controls, and employee training in accord with 29 CFR 1910.1030 (see Procedure No. S&H-006).

6. IMPLEMENTATION

(a) Employees who receive first aid training shall receive basic training on the hazards of bloodborne pathogens, and on ways to prevent exposure. If this information is not included in the first aid course curriculum, it shall be provided by the field safety and health staff.

(b) First aid kits shall be equipped with disposable gloves, a CPR isolation/barrier device, and soap or other antiseptic cleanser (alcohol towelette, Betadine, etc.).

(c) If an exposure incident as defined above occurs, the project manager, site manager, or field safety and health staff shall initiate the following actions.

(1) As soon as possible after the incident, but not later than the end of the same work shift, the Vice President, Safety and Health shall be notified of the exposure incident. The form in Exhibit A (Infectious Materials Exposure Report) of this procedure may be used for this purpose, or the information requested in the form shall be provided.

Note: Due to the importance of prompt medical evaluation, if the Vice President, Safety and Health cannot be contacted, the information required in (1) shall be collected, and the following steps initiated without waiting for further instruction.

(2) The exposed employee(s) shall be notified of the availability of confidential medical evaluation and follow-up. Medical evaluation can be arranged through ICF Kaiser's medical consultant, (1-800-229-3674) or locally through a hospital or physician, whichever results in the least delay.

(3) When feasible, the identity of the source individual shall be obtained if it is not known. If the source individual cannot be identified, either by lack of knowledge (e.g., exposure at a waste site), or due to state or local privacy laws, that fact shall be documented.

(4) Consent to test the source individual's blood for HBV and HIV infectivity shall be sought. If consent is withheld, that fact shall be documented. If consent is granted, or not required by law, the blood tests shall be conducted as soon as feasible, and the results documented. The results of the source individual's testing shall be made available to the exposed employee(s) in compliance with applicable privacy laws. The testing results shall be conveyed to the exposed employee(s) by the evaluating physician. Consent to sample and test the source individual's blood shall be coordinated through the evaluating physician.

(5) A sample of the exposed employee(s) blood shall be collected as soon as feasible, and consent to test the blood shall be sought. If consent is granted, the blood shall be tested for HBV and HIV status. If consent is not granted, the blood sample shall be stored for 90 days under the care of the evaluating physician. If during the 90 day period, the exposed employee(s) grants consent for testing, the testing shall be done as soon as feasible. Collection and testing (if consented to) of the exposed employee(s) blood shall be coordinated through the evaluating physician.

(6) Additional medically indicated post exposure follow-up and treatment shall be provided to the exposed employee(s), by or under the direction of the evaluating physician.

(d) For each employee involved in an exposure incident, the evaluating physician shall prepare a written opinion within 15 days of completing the evaluation. A copy of the written opinion shall be provided to the exposed employee(s). The content of this written opinion is limited to:

- Indication (positive or negative) for hepatitis B vaccination, and whether the employee has received the vaccination.
- That the exposed employee(s) has been informed of the results of the evaluation.
- That the exposed employee(s) has been told of any medical condition resulting from the exposure incident.

(e) If the exposed employee(s) declines hepatitis B vaccine under the medical evaluation and written opinion, the declination form (Exhibit B) shall be completed and retained. If the exposed employee(s) later requests hepatitis B vaccine, the vaccination shall be provided, according to the recommendation of the evaluating physician.

7. EXHIBITS

The following forms shall be used for documenting activities associated with this procedure:

Exhibit A: Infectious Materials Exposure Report

Exhibit B: Hepatitis B Vaccine Declination

All records relating to an exposure incident, and post-exposure evaluation, with the exception of the initial report, and information necessary to comply with occupational injury and illness recordkeeping requirements, shall be treated as confidential medical records.

EXHIBIT A

INFECTIOUS MATERIALS EXPOSURE REPORT

THIS COMPLETED FORM, OR THE INFORMATION REQUESTED ON IT, MUST BE FORWARDED TO THE ES&H SERVICE UNIT IN PITTSBURGH, OR OAKLAND, **BEFORE THE END OF THE SHIFT** DURING WHICH THE INCIDENT OCCURRED.

Date of Incident _____ Time of Incident _____

Name of Injured _____

Location of Incident _____

Type and Extent of Injury _____

_____

_____

_____

_____

Name(s) of First Aid Provider(s) _____

_____

_____

_____

DID AN "EXPOSURE INCIDENT" (as defined below) OCCUR DURING THIS EVENT? (CIRCLE ONE) **YES NO**

WAS BLOOD, OR "OTHER POTENTIALLY INFECTIOUS MATERIAL" PRESENT IN THIS INCIDENT? (CIRCLE ONE) **YES NO**

DEFINITIONS:

"Exposure Incident" means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the provision of first aid.

"Other Potentially Infectious Material" means:

(1) The following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between bodily fluids;

(2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); and

(3) HIV[1]-containing cell or tissue cultures, organ cultures, and HIV- or HBV[2]-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

[1] HIV means human immunodeficiency virus.

[2] HBV means hepatitis B virus.

EXHIBIT B

HEPATITIS B VACCINE DECLINATION

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself. However, I decline Hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

_____

(EMPLOYEE'S SIGNATURE)

_____

(DATE)

_____

(RECEIVED BY)

_____

(DATE)

TITLE: COLD ENVIRONMENTS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to protect workers exposed to cold environments.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) Hypothermia

A condition when a person's body loses heat faster than it can be produced. If body temperature drops to 95°F (98.6°F is normal), uncontrollable shivers occur. If cooling continues, these other symptoms may occur:

- Vague, slow, slurred speech
- Forgetfulness, memory lapses
- Inability to use hands
- Frequent stumbling
- Drowsiness
- Impairment of judgment

(b) Frostbite

A condition in which part of the body is frozen. Some of the symptoms may be:

- Loss of sensations of touch, pressure, and pain. May occur without awareness of any numbness or other sensation.
- Just before freezing, the skin becomes bright red.
- At freezing, small patches of white appear on skin.
- Skin becomes elastic.

4. RESPONSIBILITIES

(a) The project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

(a) Cold, wet, windy conditions make prime hypothermia weather. Precautions shall be taken to keep warm.

(b) In cold environments employees shall test for symptoms of hypothermia and frostbite often and wear clothing that is loose and does not restrict the flow of the blood to the limbs.

(c) If an employee suspects a co-worker has experienced frostbite, they shall seek medical attention immediately.

6. IMPLEMENTATION

(a) Workers shall wear warm clothing, such as mittens, heavy socks, etc., when the air temperature is below 40-45° Fahrenheit (F). Chemical protective clothing, if required by the project, may be used to partially protect the employee from the cold.

(b) When the air temperature is below 30-40°F (depending upon employee comfort), clothing for warmth, in addition to chemical protective clothing where necessary, shall be provided. This shall include insulated suits, such as whole-body thermal underwear; wool socks or polypropylene socks to keep moisture off the feet if there is a potential of work activity which would cause sweating; insulated gloves (when air temperatures are extremely low (less than 5-10°F), gloves with reflective surfaces, which reflect body heat back to the hand, shall be used); boots; and insulated head cover, such as knit caps (ski caps).

(c) At air temperature below 35°F, the following work practices shall be followed:

- If the clothing of an employee could become wet on the job site, the outer layer of clothing shall be impermeable to water.
- If an employee's underclothing (socks, mittens, etc.) becomes wet in any way, the employee shall change into dry clothing immediately. If the clothing becomes wet from sweating, the employee may finish the task causing the sweating before changing into dry clothing.
- Employees shall be provided a warm area (65°F or above) to change from work clothing into street clothing.
- Employees shall be provided a warm break area (65°F or above).
- If appropriate, space heaters shall be provided in the work area to warm the hands, feet, etc. Necessary fire and electrical safety practices shall be observed when using space heaters. Space heaters shall be shut off when the site is not occupied.

- Hot liquids, such as soups, warm, sweet drinks, etc. shall be provided in the break area. The intake of caffeinated beverages shall be limited because of the attendant diuretic and circulatory effects.
- The buddy system shall be practiced at all times. Any employee observed with severe shivering shall leave the cold area immediately.
- Employees shall layer their clothing, i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing.
- Employees shall avoid overdressing when going into warm areas or when performing activities which are strenuous. This could lead to a heat stress problem.
- Auxiliary heated versions of handwear, footwear, etc., can be used in lieu of mittens, insulated socks, etc., if extremely cold conditions exist, and if compatible with the hazards in the work area.
- Employees handling volatile liquids (gasoline, hexane, alcohol, etc.) shall take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.
- Work shall be arranged in such a way that sitting still or standing for long periods is minimized.

(d) All employees who work in cold areas shall be trained in the following subjects in accordance with Procedure S&H-006:

- Proper first aid treatment
- Proper clothing practices
- Proper eating and drinking habits
- Recognition of impending adverse health effects
- Safe work practices

(e) In contaminated areas, clothing worn for warmth under the chemical protective clothing can be laundered in normal fashion, without the wash water being collected as contaminated water as long as the chemical protective clothing is properly worn and remains intact.

(f) If there is a rip or tear in the chemical protective clothing worn in a contaminated area, the clothing for warmth shall be handled as potentially contaminated, and the water in which it was washed shall be collected as potentially contaminated water. More rigorous steps may be required if materials handled are extremely toxic (dioxin, etc.).

7. EXHIBITS

Not applicable.

Estimated Wind Speed (in mph)	Actual Temperature Reading (F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	*LITTLE DANGER* In < hr with dry skin. Maximum danger of false sense of security.				*INCREASING DANGER* Danger from freezing of exposed flesh within one minute.			*GREAT DANGER* Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.
Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36C (98.6F) per cold stress TLV.

200545

TITLE: HOT ENVIRONMENTS

1. PURPOSE

To establish the minimum requirements for ICF Kaiser Engineers (ICF Kaiser) to protect workers exposed to hot environments.

2. SCOPE

This procedure applies in its entirety to all ICF Kaiser projects unless a variance from its requirements is granted by the Vice President, Safety and Health.

3. DEFINITIONS

(a) **Acclimatized**

Workers who have developed physiological adaptation to hot environments characterized by increased sweating efficiency, circulation stability, and tolerance of high temperatures without stress. Acclimatization occurs after 7 to 10 consecutive days of exposure to heat; and much of its benefit may be lost if exposure to hot environments is discontinued for a week.

(b) **Chemical Protective Clothing**

Apparel which is constructed of relatively impermeable materials with the intent to act as a barrier to physical contact of the worker with potentially hazardous materials in the workplace. Such materials include: Tyvek™ coveralls (all types), CPF™ Series coveralls, and polyvinylchloride (PVC) coveralls and rain suits.

(c) **Unacclimatized**

Workers who have not been exposed to hot work conditions for one week or more, or who have become heat-intolerant due to illness, or other reason.

(d) **Heat Stress (hyperthermia)**

A common hazard to employees working on projects involving exposure to hazardous substances, most particularly when impermeable protective clothing is used. This problem can occur at ambient temperatures below what is normally considered "hot weather." The body normally sheds excess heat primarily through radiation (capillaries in the skin dilate, transferring heat from the body core to the surface), and evaporation of sweat. Thermodynamically, evaporation is much more effective than radiation. Heat stress results when the body's regulating mechanisms are inadequate to dispose of internally generated, and externally supplied heat.

Heat is normally generated internally through metabolic processes, and the quantity of heat generated corresponds to the level of muscle activity. External heat sources include radiant bodies (the Sun, furnaces, fires, etc.), and convection (temperature difference between the skin and ambient air). External heat gain can occur through conduction from hot surfaces, but this is normally not significant since such contact will be avoided (it could be a very important factor if immersed in water, however).

The overall heat balance of a human can be written as an equation:

$$H = M \pm R \pm C - E$$

where:
H = body heat burden
M = metabolic heat gain
R = radiant or infrared heat load
C = convective heat load
E = evaporative heat loss.

The "normal" person maintains a core body temperature of 37°C ± 1°C, (98.5°F ± 1.8°F). Core body temperatures should not exceed 38°C (100.4°F) as a result of the total heat burden. Heat stroke occurs when the core temperature is greater than 40°C, and death is probable at core temperatures ≈ 42°C.

Working outdoors in hot, sunny weather places the worker under increased heat load from M, R, and C. If the heat loss from E, is less than the sum of M, R, and C, the total body heat balance will increase. Unfortunately, the use of impermeable protective clothing can reduce the heat loss from E to near zero.

4. RESPONSIBILITIES

(a) The regional, or project manager has overall responsibility for establishing and ensuring compliance with this procedure.

(b) The field safety and health staff is responsible for implementing and/or monitoring activities associated with this procedure.

(c) It is the responsibility of all managers and supervisory personnel to enforce this procedure and of each employee to follow it.

5. GENERAL REQUIREMENTS

Not applicable.

6. IMPLEMENTATION

(a) Recommended Controls

NOTE: The guidelines discussed in this section are only intended to be used as a means for initial establishment of a work-rest regimen.

(1) The field safety and health staff shall evaluate the conditions at a specific operation and make final determinations of the work-rest regimen.

(2) Intake of fluid shall be increased beyond that which satisfies thirst, and it is important to avoid "fluid debt," which will not be made up as long as the individual is sweating.

(3) Two 8 oz. glasses of water should be taken **prior** to beginning work, then up to 32 oz per hour during the work shift; fluid replacement at frequent intervals is more effective.

(4) The best fluid to drink is water; liquids like coffee or soda do not provide efficient hydration, and may increase loss of water.

(5) If commercial electrolyte drinks (Gatorade, Squincher, etc.) are used, the drink should be diluted a to 2 with water, or 8 oz of water should be taken with each 8 oz of electrolyte.

(6) Additional salt is usually not needed; and **salt tablets shall never be taken.**

(7) Replacement fluids shall be cool, but not cold.

(8) Breaks shall be taken in a cool, shaded location, and any impermeable clothing should be removed.

(9) Dry clothing or towels shall be available to minimize chills when taking breaks.

(10) Manual labor shall not be performed during breaks, other than paperwork, or similar light tasks.

- Other controls that may be used include:
- Scheduling work at night or during the cooler parts of the day (6 am - 10 am, 3 pm - 7 pm)
- Erecting a shade over the work area
- Use of cooling garments

This last option is expensive and logistically difficult to implement.

(11) Work Schedules

(i) Work schedules providing periodic rest periods shall be implemented when employees are exposed to heat stress. Schedules shall be developed based on instrumental measurements of the environment (temperature, radiant heat, humidity, and wind speed) with the resulting measurement compared to published guidelines (NIOSH REL, ACGIH TLV, for Heat Stress). When using this method, allowance must be made for the use of impermeable protective clothing.

(ii) Alternate methods of establishing a work schedule are based on measuring physiological indices (heart rate, or oral temperature) which correlate to the core body temperature.

NOTE: Oral temperature does not correlate well to increasing core temperature (during heat exhaustion, it may be normal or even depressed due to extreme peripheral vasodilation), and is subject to effects from drinking replacement fluids.

(iii) Measures of heart rate (pulse) appear to correlate well with heat-related stress, and can be used to estimate the impact of heat stress on individuals with differing levels of fitness (i.e. individuals with a pulse of 150/minute are experiencing about the same level of stress, even though the work output required to reach this rate will be quite higher for a fit person). The heart rate also incorporates the combined effects of environmental heat, muscle activity, and elevated body temperature, making it a useful, and easily measured variable.

The procedure for controlling heat stress via establishment of work schedules based on the measurement of heart rate is presented below.

(12) The field safety and health staff shall determine the potential for heat stress based on planned activities, and weather forecasts.

If the potential for heat stress exists:

- All site workers shall be informed of the potential for heat stress during the daily safety meeting.
- The field safety and health staff shall determine if any workers are at particular risk for heat stress due to illness, etc.
- The field safety and health staff shall assure that sufficient quantities of potable water, and electrolyte drinks are available in the decon area; and that a shaded rest area is available at, or immediately outside the decon area.
- All workers shall drink 16 oz. of water prior to beginning work; and at least 16 oz. during each rest period.

(i) The initial work period and monitoring frequency, is set according to the table in Attachment A.

(ii) Within the first minute of each rest period, each worker's heart rate (pulse) shall be measured, and compared to the following:

Initial heart rate: ≤ 110 beats/minute (28 beats/15 sec).

(iii) Each worker's heart rate will be measured again three minutes later, and compared to the following:

Recovery heart rate: ≤ 80 beats/minute (20 beats/15 sec).

(iv) If both heart rate criteria are met, the subsequent work period may be increased by one third, provided the temperature remains constant.

(v) If the initial heart rate is > than 110 beats per minute, or the recovery rate is not less than 80 beats per minute, the subsequent work shift is decreased by one third.

(13) Additional Means of Prevention

(i) Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments. If cooling devices are worn, only physiological monitoring shall be used to determine work activity.

(ii) All breaks will be taken in a cool, shaded rest area.

(iii) Employees shall open or remove chemical protective garments during rest periods.

(iv) All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress.

(v) Employees shall be informed of the harmful effects of excessive alcohol consumption in the prevention of heat stress.

(b) **Training**: Those personnel potentially exposed to heat stress shall receive the following training. Training provided as a part of this procedure shall be documented in accordance with Procedure No. S&H-006.

(1) Employees shall be trained on:

- Sources of heat stress, influence of protective clothing, and importance of acclimatization
- How the body handles heat

- Heat related illnesses
- Preventative/Corrective measures
- First Aid procedures for heat stress

(2) ICF Kaiser Supervisors shall be trained on measurement methods and calculations of heat stress indices, and establishing work schedules.

7. EXHIBITS/ATTACHMENTS

Attachment A - Measurement Schedule

The following Employee Physiological Monitoring Record as shown in Attachment B of this manual is used for documenting activities associated with this procedure.

ATTACHMENT A

FREQUENCY OF MEASUREMENT		
AMBIENT TEMPERATURE (°F)	NORMAL WORK CLOTHING[1]	IMPERMEABLE WORK CLOTHING
70 °F – 80 °F	N/A	90 MIN
80 °F – 85 °F	120 MIN	60 MIN
85 °F – 90 °F	90 MIN	30 MIN
> 90 °F	60 MIN	15 MIN

[1]Normal work clothing is cotton coveralls, or other cotton clothing with long sleeves and pants.

Note: Individuals with pre-existing medical conditions or restrictions contraindicating exposure to elevated environmental heat are precluded from assignments that involve exposure to high temperatures.

Note: Healthy individuals will vary significantly in their tolerance to heat, and heat tolerance can be affected by minor illnesses (cold, flu) and by prescription, and over-the-counter medications.

Note: The heart rate measure is only a part of the overall situation to be considered; other objective, and subjective symptoms of heat stress, such as: extreme fatigue, nausea, disorientation, lightheadedness, and breathlessness must be fully considered when evaluating the adequacy of control measures.

Note: The heart rate measure will provide guidance that can be significantly different for each member of a field team based on their acclimatization, physical fitness, and heat-tolerance. If it is critical that all team members use the same work/break schedule, the schedule that accommodates the least heat-tolerant team member will be observed.

ATTACHMENT B

EMPLOYEE PHYSIOLOGICAL MONITORING RECORD FOR HEAT STRESS

Employee Name		Date	
Employee SS#		Business Unit	
Project Location		Project No.	
Completed By			
Pre-Work Baseline		After 5th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Heart Rate		Initial Heart Rate	
		Recovery Heart Rate	
After 1st Work Period		After 6th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 2nd Work Period		After 7th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 3rd Work Period		After 8th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	
After 4th Work Period		After 9th Work Period	
Ambient Air Temperature		Ambient Air Temperature	
Initial Heart Rate		Initial Heart Rate	
Recovery Heart Rate		Recovery Heart Rate	